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Response Action Contract

FINAL
FEASIBILITY STUDY REPORT
FOR
OPERABLE UNIT 1 (OU-1)
OFF-SITE SOILS
FOR
CORNELL-DUBILIER ELECTRONICS
SUPERFUND SITE

SOUTH PLAINFIELD
MIDDLESEX COUNTY, NEW JERSEY

AUGUST 2001

Contract No: 68-W-98-214

FOSTER WHEELER
FOSTER WHEELER ENVIRONMENTAL CORPORATION

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EPA WORK ASSIGNMENT NUMBER: 018-RICO-02GZ
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FOSTER WHEELER ENVIRONMENTAL CORPORATION
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CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
FEASIBILITY STUDY REPORT
for
OPERABLE UNIT 1 (OU-1)
OFF-SITE SOILS

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

INTRODUCTION

The United States Environmental Protection Agency (EPA) authorized Foster Wheeler Environmental Corporation (Foster Wheeler Environmental) to perform a Feasibility Study (FS) at the Cornell-Dubilier Electronics Superfund site (the site) located in South Plainfield, Middlesex County, New Jersey, in response to Work Assignment 018-RICO-02GZ (EPA, 1999), issued under EPA RAC II Contract Number 68-W-98-214. This FS was conducted pursuant to Foster Wheeler Environmental's EPA-approved Final Work Plan (Foster Wheeler Environmental, 2000) and current EPA guidance.

The FS for the site was separated into three operable units (OUs): the off-site soils (OU-1), the on-site soils and buildings (OU-2), and the groundwater and Bound Brook corridor (OU-3). This report for OU-1 focuses on the soils of residential, commercial, and municipal properties (off-site properties) in the vicinity of the site. OU-2 and OU-3 will be addressed in separate Feasibility Study Reports.

The nature and extent of contamination at the off-site soils is based on the data presented in the Remedial Investigation Report for Operable Unit 1 (OU-1), Off-Site Soils (Foster Wheeler Environmental, 2001a). As discussed in the RI, EPA determined that residences would only be sampled for PCBs based on previous sampling performed by the EPA removal program. Soil sampling was conducted at various properties and rights-of-way (ROWs) in the vicinity of the site. Shallow (0 to 2 inches below ground surface (bgs)) and deeper (between 4 and 18 inches bgs depending on property/ROW) surface soils were collected from 19 individual properties and along 13 ROWs to further delineate the extent of off-site soils contamination. A total of 807 environmental samples were collected. Aroclor-1254 and Aroclor-1260 were detected in soils during laboratory analysis.

Based on the results presented in the OU-1 Remedial Investigation Report, three off-site properties (Property 1 - 408 Hamilton Boulevard, Property 13 - 109 Arlington Avenue, and Property 18 - 321 Spicer Avenue) have been identified as areas of contamination containing approximately 620 cubic yards (cy) of PCB-contaminated soil above the Preliminary Remediation Goal (PRG) of 1 milligram/kilogram (mg/kg). There are additional properties within the off-site study area that have not been sampled, but that are adjacent to ROWs containing elevated levels of PCBs and/or along major thoroughfares exiting the site. Further investigation of these properties, including additional soil sampling and interior dust sampling, should be performed concurrent with pre-design activities at the three properties identified above. Based on this sampling, additional areas of contamination, if any, should be incorporated into the remedial design and remedial action. For purposes of the FS, it was estimated that the pre-design investigation may include the sampling of approximately 25 additional properties and, as a result, 12 additional properties, containing approximately 1,480 cy of PCB-contaminated soil above the PRG, and 7 properties with elevated PCBs in interior dust, may be identified.

DEVELOPMENT, SCREENING AND DETAILED EVALUATION OF REMEDIAL ALTERNATIVES

The procedures and methods used in developing and evaluating remedial alternatives for the contaminated soil were those presented in the EPA's Guidance for Conducting Remedial Investigations/Feasibility Studies under CERCLA, Interim Final (EPA, 1988a). An initial list of potentially applicable technology types and process options was identified for each of the general response actions developed for contaminated soils at the off-site properties. These technologies and processes were screened with respect to technical implementability, based on: specific site conditions; physical characteristics; nature and extent of contamination; exposure pathways and risk; remedial response objectives; and clean-up levels. The feasible technologies were then grouped into potential remedial action alternatives and evaluated in detail against seven of the nine criteria based on EPA's guidance. The two remaining criteria, state acceptance and community acceptance, are "modifying" criteria and will be evaluated later in the FS process.

Three alternatives were developed and evaluated for the off-site properties. These alternatives and the comparative analysis of alternatives are summarized below.

Alternative 1: No Action
Under this alternative, the EPA would take no action at the off-site properties to prevent exposure to the surface soil contamination. The contaminated soil would be left in place without treatment or controls. Five-year reviews would be performed to assess the need for further action. The No Action alternative does not mitigate any exposure pathways, nor does it reduce the toxicity, mobility, or volume of the contaminated soil.

Alternative 2: Limited Action
The Limited Action alternative would provide engineering and institutional controls to prevent exposure to surface soils. Engineering controls would include capping of contaminated soils; institutional controls would include voluntary implementation of deed restrictions to limit future use of the properties, implementation of public awareness programs, and five-year reviews to assess the need for future remedial actions. In addition, interior cleaning of homes and post-cleaning sampling may be performed, as necessary, based on pre-design sampling.

Alternative 3: Excavation/Treatment (if necessary)/Off-Site Disposal
This alternative includes the excavation of approximately 2,100 cy of contaminated soil and transport off-site for disposal at a non-hazardous, Resource Conservation and Recovery Act (RCRA) or Toxic Substances Control Act (TSCA) regulated landfill, based on the levels of PCBs present in the soils. If necessary to meet the requirements of the disposal facilities, treatment of the soil at the disposal facility may be performed. Once excavation activities have been completed, clean soil will be used as backfill. Because this alternative includes removal of contaminants to applicable cleanup levels, periodic site reviews would not be required.

Comparative Analysis of Alternatives

- Overall Protection of Human Health and the Environment: Alternatives 2 and 3 would provide protection of human health and the environment by eliminating, reducing, or controlling risk through removal (Alternative 3) or engineering and institutional controls (Alternative 2). Alternative 3 would be more protective, since contamination would be removed from the off-site properties. The possibility exists for violation of the engineering and/or institutional controls implemented under Alternative 2, with the potential for exposure to contaminated soil. Alternative 1 would not reduce the risk to human health or the environment.

- Compliance with ARARs: Only Alternative 3 would comply with the potential ARARs from federal and state laws. Neither the No Action nor the Limited Action alternatives (i.e., Alternatives 1 and 2, respectively) directly addresses removal of the contaminated media and thus, would not satisfy the clean-up objectives. The removal of PCB-contaminated soils (Alternative 3) would comply with the EPA's Soil Screening Level (SSL) for Direct Ingestion.

- Long-Term Effectiveness and Permanence: Alternative 1 is not effective because contaminated soils would be left at the off-site properties. Alternative 2 involves the use of engineering and institutional controls to address the existing site conditions, and therefore, the risk associated with direct contact with contaminated soils would be reduced. Alternative 3 would reduce the potential human health risks associated with direct contact with contaminated soils; environmental impacts would also be reduced by implementation of this alternative. The selected off-site disposal facilities for this alternative would be properly designed and operated in accordance with state and federal regulations, and thus, the long-term risks and liabilities posed by off-site disposal would be minimized.

- Reduction of Toxicity, Mobility, or Volume of Contaminants: Alternative 1 would not result in a reduction of toxicity, mobility, or volume of contaminants, since no active measures would be employed. Alternative 2 would reduce mobility by capping, but it would not reduce the toxicity or volume of contaminants. Alternative 3 would decrease the volume of the contaminants at the off-site properties and remove them for off-site treatment (if necessary) and disposal. Treatment and/or disposal in an appropriately permitted off-site facility would significantly reduce the mobility of contaminants and treatment would also reduce the toxicity of contaminants.

- Short-Term Effectiveness: Alternative 1 presents the least short-term risk to on-site workers and the community since there is no construction required to implement this alternative. Risks to the community would not be increased; however, future disturbance of the surface soil could potentially increase exposure risks through direct contact, inhalation, and ingestion of airborne dust. Alternatives 2 and 3 involve disruption of contaminated soils that could pose a risk to on-site workers and the community. The risk of releases of contaminated media is principally limited to wind blown dust or transport of contaminated soils from surface water run-off. Dust control and erosion control measures will limit the amount of materials that may migrate to a potential receptor during construction activities. The beneficial results of the off-site disposal or capping of contaminated material would occur immediately following implementation. The implementation time for these alternatives is estimated to be three to six months. This would include pre-design, design and construction activities.

- Implementability: Alternative 1 is the simplest alternative to implement from a technical viewpoint since it involves no action. Alternative 2 would be somewhat more difficult to implement. Installation of the cap would be relatively easy, requiring only conventional construction techniques. However, substantial coordination with public agencies and private property owners would be required for institution of land use restrictions, periodic inspections and sampling, and providing information to the community. Coordination with state and local authorities would also be required in the future for reviewing the five-year assessment data and making the appropriate decisions. For Alternative 3, simple excavation and construction technologies would be easily implemented, as conventional and standard earthwork equipment would be used. Coordination would also be necessary with property owners during construction activities in order to obtain permission to work on their property.

- Cost: The estimated present worth cost for Alternative 1 (No Action) is $0. The estimated present worth cost for Alternative 2 (Limited Action) is $770,000, which is the cost for interior cleaning of homes and implementation and maintenance of engineering and institutional controls. The estimated present worth cost for Alternative 3 (Excavation/Treatment (if necessary)/Off-site Disposal) is $760,000, which is the cost associated with excavation and off-site disposal of contaminated soil, and interior cleaning of homes.

SECTION 1.0

1.0 INTRODUCTION

This Feasibility Study Report for Operable Unit 1 (OU-1), Off-Site Soils, of the Cornell-Dubilier Electronics Superfund site (the site), located in Middlesex County, New Jersey, has been prepared by Foster Wheeler Environmental Corporation (Foster Wheeler Environmental) in response to Work Assignment 018-RICO-02GZ (EPA, 1999), issued under United States Environmental Protection Agency (EPA) RAC II Contract Number 68-W-98-214. This report summarizes the evaluation procedure and results of the feasibility study (FS) performed for the residential, commercial, and municipal properties (off-site properties) in the vicinity of the site. This FS was conducted pursuant to Foster Wheeler Environmental's EPA-approved Final Work Plan (Foster Wheeler Environmental, 2000) and current EPA guidance.

The FS for the site was separated into three operable units (OUs): the off-site soils (OU-1), the on-site soils and buildings (OU-2), and the groundwater and Bound Brook corridor (OU-3). This report focuses on the soils of residential, commercial, and municipal properties in the vicinity of the site. The results of the on-site soils and buildings investigation (OU-2) will be addressed in the OU-2 Feasibility Study Report, and the results of the groundwater and Bound Brook corridor investigations (OU-3) will be addressed in the OU-3 Feasibility Study Report after additional site activities are performed.

1.1 Purpose and Organization of the Report

The objective of the FS for OU-1 was to develop and screen feasible alternatives to remediate the soil contamination present at the off-site properties. Combinations of technologies were assembled into alternatives for remediation of the contamination. The most promising remedial alternatives were then evaluated against seven of the nine EPA evaluation criteria and compared against one another. This evaluation provides a basis for the EPA to select the best remedial alternatives and to sign a Record of Decision (ROD) for OU-1. Specifically, the FS objectives were:

- Identification of feasible remedial technologies for containment, removal, or treatment and disposal of contaminated soils;

- Screening and assembly of the feasible technologies into remedial alternatives for detailed analysis; and

- Detailed evaluation and comparison of the remedial alternatives to provide a basis for EPA to select the best remedial alternative.

This Feasibility Study Report was prepared utilizing the data and information presented in the Remedial Investigation Report for Operable Unit 1 (OU-1), Off-Site Soils (Foster Wheeler Environmental, 2001a) and follows procedures outlined in EPA's *"Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA – Interim Final"* (EPA, 1988a).

This Feasibility Study Report is divided into six sections, Sections 1.0 through 6.0, as follows:

Section 1.0, Introduction, provides background information regarding the Cornell-Dubilier Electronics site and the off-site properties, including location and features, geology and hydrogeology, history, and regulatory actions. The nature and extent of contamination, and baseline risk assessments are also summarized.

Section 2.0, Identification and Screening of Technologies, presents the feasible technologies identified to meet the general response actions; the technical criteria and the site-specific requirements that were used in the technology selection process; and the results of the remedial technology screening. A summary of the remedial action objectives is also presented.

Section 3.0, Development and Initial Screening of Alternatives, presents the remedial alternatives developed by combining the technologies that passed the screening in Section 2.0. Alternatives were developed in the three general categories required by the Superfund Amendments and Reauthorization Act (SARA): No Action, Limited Action, and Treatment/Disposal. When necessary to reduce the number of alternatives subject to detailed evaluation, a preliminary screening of remedial alternatives is typically presented in this section, including descriptions of the effectiveness, implementability, and cost screening for each alternative. For the off-site properties, the number of feasible alternatives developed was not sufficiently large to require a screening of alternatives, and all developed alternatives were carried forward for detailed evaluation.

Section 4.0, Detailed Analysis of Remedial Alternatives, presents a more detailed description and evaluation of each of the alternatives identified in Section 3.0. The analysis of each alternative was performed against the first seven of the nine assessment criteria (EPA, 1988a). This section also presents the comparative analysis of alternatives relative to the evaluation criteria.

Section 5.0, References, provides a list of the references and previous studies cited in this report.

Section 6.0, Glossary of Abbreviations and Acronyms, presents a list of the acronyms and abbreviations cited throughout the Feasibility Study Report.

The Feasibility Study Report has three appendices (Appendix A through Appendix C). Appendix A contains the major construction components for the remedial alternatives. Appendix B provides the conceptual estimates of the capital and operation and maintenance costs. Appendix C provides the estimation of soil areas/volumes requiring remediation.

1.2 Background Information

1.2.1 Site and Off-Site Properties Description

1.2.1.1 Site Conditions

The Cornell-Dubilier Electronics site consists of approximately 27 acres (Latitude 40°34'35.0", Longitude 74°24'51.0"), located at 333 Hamilton Boulevard in South Plainfield, Middlesex County, New Jersey (Figure 1-1). Cornell-Dubilier Electronics Corporation, Inc. (Cornell-Dubilier

Electronics) manufactured electronic components at the site from 1936 to 1962. Currently, the Hamilton Industrial Park, which consists of approximately 15 small industrial operations, occupies the western portion of the site property (Figure 1-2).

The western portion of the site is largely paved or occupied by buildings and is gently sloping, with elevations ranging from approximately 70 to 82 feet above mean sea level (msl). The property is bordered to the southwest, across Spicer Avenue, by single-family residential properties and to the northwest, across Hamilton Boulevard, by mixed residential and commercial properties (Figure 1-3).

The central portion of the site is primarily an open field, with some wooded areas to the south and a semi-paved area in the middle. This area is relatively level, with elevations ranging from approximately 71 to 76 feet above msl.

The site drops steeply to the northeast and southeast, where it is bordered by the Bound Brook and the former Lehigh Valley Railroad, Perth Amboy Branch (presently Conrail) on the northeast and to the southeast by the South Plainfield Department of Public Works property, which includes an unnamed tributary to the Bound Brook. The eastern portion of the site consists primarily of a wetland area bordering the Bound Brook. Elevations in this area range from approximately 71 feet above msl at the top of the bank to approximately 60 feet above msl along the Bound Brook.

1.2.1.2 Off-Site Property Conditions

The off-site properties and public rights-of-way (ROWs) addressed in the OU-1 remedial investigation (RI) were located in the following three areas:

1. The area immediately south of the site which includes the following roadways (Figure 1-3):

    - Hamilton Boulevard (one property)
    - Spicer Avenue (four properties; along ROW)
    - Delmore Avenue (three properties; along ROW)
    - Arlington Avenue (one property; along ROW)
    - Kosciusko Avenue (two properties; along ROW)
    - Tremont Avenue (along ROW)
    - Harvard Avenue (along ROW)
    - Jackson Avenue (one property; along ROW)
    - Belmont Avenue (two properties)
    - Kenneth Avenue (along ROW)

2. The area immediately west of the site which includes the following roadways (Figure 1-3):

    - Bergen Street (along ROW)
    - Hancock Street (two properties; along ROW)

3. An area along the Bound Brook corridor, approximately ½ mile northwest of the site which includes the following roadways (Figure 1-4):

- Lowden Avenue (along ROW)
- Oakmoor Avenue (two properties)
- Fred Allen Drive (along ROW)
- Schillaci Lane (one property; along ROW)

The off-site properties are largely developed, consisting of residential, commercial, and municipal properties. The residential properties are characterized primarily by single or two family homes, driveways, sidewalks, and mowed lawns and landscaping. The commercial properties in the vicinity of the site are characterized by one or two story structures, some landscaping, and a larger percentage of paved areas for parking, relative to the residential properties. The municipal properties are characterized primarily by larger structures, large parking areas, and extensive mowed lawns and landscaping.

1.2.1.3 Climate

The climate of the South Plainfield area can be characterized as temperate (SPEC, 1990). Monthly climatological data for temperature and precipitation for South Plainfield are presented in Table 1-1. The temperatures range from an average of 29°Fahrenheit (°F) in January to an average of 75°F in July, with an average annual temperature of about 53°F (Weather Channel, 2001). Summer temperatures occasionally exceed 100°F, and temperatures in the middle to upper 80s frequently occur. Winter temperatures generally are not below 20°F for long periods (Weather Channel, 2001). The average annual precipitation is approximately 49 inches, and the monthly averages provided in Table 1-1 indicate that precipitation occurs fairly evenly throughout the year, with the least precipitation during the winter months (Weather Channel, 2001). Rainfall is heaviest in July. In nearby Newark, the average wind velocity is 10.2 miles per hour from the southwest. The average relative humidity is 72 percent and 54 percent at 1 a.m. and 1 p.m., respectively (SPEC, 1990).

1.2.1.4 Regional Geology

The off-site properties lie within the Piedmont Physiographic Province and are underlain by the late Triassic to early Jurassic Age Brunswick Formation of the Newark Group. The Brunswick Formation occupies the Newark Basin, the largest of a series of fault-block basins extending from Nova Scotia to South Carolina (Froelich and Olsen, 1985). These basins were formed in the Triassic Period during initial continental rifting (Van Houten, 1969), infilled with stream- and lake-deposited sediments, and intruded and overlain by basaltic magma. The sedimentary units have been lithified and folded. From the site area northward, bedrock units are overlain by unconsolidated Quaternary and pre-Quaternary glacial deposits. Bedrock was not encountered during the off-site soils investigation, and therefore is not discussed in the report. An extensive discussion of bedrock characteristics will be presented in the Feasibility Study Report for the On-Site Soils and Buildings (OU-2) and the Feasibility Study Report for the Groundwater and Bound Brook (OU-3).

Glacial Deposits

Quaternary and pre-Quaternary glacial and fluvioglacial deposits overlie bedrock across much of the northern portion of the state. Evidence of Kansan and Illinoisan glaciation occurs as patches of highly leached till south of the Wisconsin terminal moraine. The terminal moraine deposits, marking the southern limit of the glacial advance, are located within 2 miles northeast of the site. Wisconsin glaciation has removed or covered older glacial deposits north of the terminal moraine (Stanford, 2000). The southernmost extent of the Wisconsin ice sheet that covered much of northern New Jersey lies roughly along a curved line from Plainfield to Metuchen and the mouth of the Raritan River near Perth Amboy.

Many of the Wisconsin drift deposits in New Jersey, which resulted from the ice sheet advancement and subsequent retreat, are locally derived. The grain size and coloration of these materials reflect that of the bedrock immediately upglacier of the depositional area (Stanford, 2000). The off-site properties in the vicinity of the site are located in an outwash area that extends southerly from the Wisconsin terminal moraine and is covered by glacial stream deposits. These deposits, where undisturbed, consist of reddish-brown to reddish-yellow sand and gravel with minor amounts of silt, and have been locally modified by construction activities.

Several areas within ¼ mile of the site have been mapped as artificial fill and trash fill. The area 0.1 mile to the south and west of the site is mapped as weathered shale, mudstone, and sandstone. The soils consist of reddish-brown to yellow sandy, silty clay to clayey, silty sand containing some shale, mudstone, and sandstone fragments. These unconsolidated materials can be as much as 30 feet thick but are generally less than 10 feet in thickness (Stanford, 1999).

Soils

The prevalent soils series within the off-site areas sampled to the south and west of the site, as identified by the Soil Survey of Middlesex County (Powley, 1987), are soils of the Reaville series: the Reaville silt loam and the Reaville-Urban land complex. Additional soils in this area are mapped as Dunellen Variant sandy loam, Ellington Variant-Urban land complex, Klinesville-Urban land complex, and Parsippany silt loam.

Reaville silt loam (ReA) consists of nearly level and moderately well drained soils. Typically, the surface layer is dark reddish brown silt loam about 10 inches thick. The subsoil is light reddish brown silt and reddish brown shaly silt loam about 12 inches thick, while the substratum is reddish brown shaly silt loam 6 inches thick. Reddish brown, partially weathered shale bedrock is present at a depth of 28 inches bgs.

Reaville-Urban land complex (RFA) consists of nearly level and moderately well drained soils and areas used for urban development. Typically, the surface layer is dark reddish brown silt loam about eight inches thick. The subsoil is light reddish brown silt and reddish brown shaly silt loam about 12 inches thick, while the substratum is reddish brown very shaly silt loam eight inches thick. Red shale bedrock is present at a depth of 28 inches bgs.

Dunellen Variant sandy loam (DvA) consists of nearly level and moderately well drained soils. The surface layer consists of two inches of black muck. The surface and subsurface layers are brown and pale brown sandy loam and have a combined thickness of 11 inches. The subsoil is 14 inches thick, consisting of brown and reddish brown sandy loam that is mottled in the upper part. Included in this mapped area are Dunellen and Ellington Variant soils and areas where the soil is gravelly or contains thin gravel beds.

The Ellington Variant-Urban land complex (ESA) consists of nearly level to gently sloping, moderately well drained soils and areas that are used for urban development. Approximately 40 percent of this unit consists of Ellington Variant soils; 40 percent is urbanized areas; 15 percent is composed of soils that extend less than 20 inches bgs to red shale bedrock, soils that contain strata of fine gravel or silt loam, and areas that have been covered by more than 20 inches of fill material; and five percent contains inclusions of Reaville, Klinesville, Rowland, and Parsippany Variant soils. Typically, the surface layer of ESA soils consists of dark brown sandy loam about 4 inches thick. The subsurface layer is brown sandy loam 16 inches thick, while the subsoil is 16 inches thick and consists of yellowish red fine sandy loam. Red shale bedrock is present at a depth of approximately 36 inches bgs.

The Klinesville-Urban land complex (KWB) consists of nearly level to gently sloping, well drained Klinesville soils and areas that are used for urban development. Approximately 40 percent of this unit consists of Klinesville soils, 40 percent are urbanized areas covered mainly by concrete, asphalt, and other impervious surfaces, and the remaining 20 percent consists of silty and sandy loams. Typically, the Klinesville soils have a surface layer composed of dark reddish brown shaly loam about eight inches thick. The subsoil is dark reddish brown shaly silt loam about four inches thick. Dark reddish brown bedrock is present at a depth of 12 inches.

The Parsippany silt loam (Pa) is nearly level and poorly drained. The surface layer is very dark brown silt loam approximately two inches thick, underlain by a subsurface layer composed of pinkish gray loam about six inches thick. The subsoil, approximately 40 inches thick, is composed of three units: the upper 16 inches are pinkish gray silty clay loam and silty clay; the middle 12 inches are reddish brown silty clay; and the lower 12 inches are reddish brown silty clay loam. The substratum is reddish brown sandy loam 60 inches thick.

The prevalent soil series within the off-site areas sampled in the Bound Brook floodplain north of the site are mapped as Dunellen Variant-Urban land complex (DWA) and Dunellen-Urban land complex (DUA) (Powley, 1987).

The DWA land complexes were the most commonly mapped series in the uplands portion of the area sampled north of the site. The DWA complex consists of nearly level to gently sloping, moderately well drained soils and areas that are used for urban development. About 40 percent of the unit consists of Dunellen Variant soils, which are described above. Another 40 percent of the unit (approximately) consists of developed lands covered by concrete, buildings, asphalt, and other impervious surfaces. Areas of Dunellen and Ellington Variant soils, inclusions of Rowland and Parsippany Variant soils, and areas that have been covered by more than 20 inches of fill material comprise the remaining 20 percent (Powley, 1987).

The DUA complex consists of nearly level to gently sloping well-drained soils and areas that are used for urban development. About 35 percent of the unit is Dunellen soils which have a surface layer of dark brown sandy loam approximately 0.5 inches thick. The subsurface layer is dark brown sandy loam about 13 inches thick, while the substratum is dark brown sandy loam and sandy loam to a depth of 60 inches. Thirty-five percent of the complex consists of developed lands covered by concrete, buildings, asphalt, and other impervious surfaces. The remaining 25 percent of the unit consists of Ellington and Ellington Variant soils, Rowland soils, and areas that have been covered by more than 20 inches of fill material.

1.2.1.5 Local Geology

Soil sampling during the OU-1 RI in off-site property areas confirmed the presence of typical Reaville series soils as described in the previous section. Shallow soils (0 to 2 inches bgs) ranged in color from red-brown to grayish-brown to dark brown, and consisted of predominantly silt, with varying amounts of clay and fine to coarse sand. These soils typically contained a gravel fraction consisting predominantly of angular to sub-angular siltstone clasts. The organic content of these soils was typically low except where roots were present.

Deeper soils (4 to 18 inches bgs) were typically red-brown in color. These soils, like the shallower soils, consisted predominantly of silt, but locally contained larger percentages of clay or sand, likely dependent on the difference in the nature of the underlying bedrock from which they formed. The presence of angular shaly and siltstone gravel was common. At several locations, the soils were mottled, indicating periodic saturation. Disturbance of the natural soils was indicated in a number of areas by the presence of coal, ash, cinders, glass, metal, concrete, and brick.

1.2.1.6 Hydrogeology

The following section presents a summary of regional hydrogeological conditions, based on information obtained from current literature. Both the regional and site-specific hydrogeology will be discussed in greater detail in a separate Feasibility Study Report (OU-3), after additional site activities are performed.

The Brunswick Formation bedrock aquifer is a gently dipping, multi-unit leaky aquifer system that consists of thin water-bearing units separated by thick intervening confining beds. The units have little primary porosity or permeability as a result of compaction and cementation. The principal means of groundwater flow within the Brunswick Formation is through secondary permeability resulting from a series of interconnected fractures (Michalski, 1990).

Although units mapped as Qwf (fluvioglacial outwash) are characterized as having high permeability, the thin surficial/glacial deposits covering the general project area are not considered a significant groundwater aquifer (Stanford, 2000). However, these deposits can promote recharge by allowing infiltration and readily transmitting water to underlying bedrock units. Thicker deposits, where present, can locally produce moderate quantities of good quality water. Groundwater was not encountered during OU-1 RI sampling of the off-site properties.

1.2.1.7 Ecology

An ecological investigation of the off-site properties was performed on 24 May 2001, and included a review of relevant background information and field characterization of the off-site properties to identify terrestrial habitats and wildlife using, or potentially using, the properties. No aquatic habitats were identified on the off-site properties.

Terrestrial Habitat Assessment

The off-site properties are located in an urban landscape, with developed lands (i.e., residential and commercial properties) prevalent throughout the area. The residential properties primarily consisted of single-family residences with manicured lawns and ornamental shrubs and trees, as well as sporadic shade trees. Several commercial properties are located within OU-1 and primarily consisted of buildings and impervious surfaces. The off-site properties were located in three general areas, the northwest area, located to the northwest of the site and north of Bound Brook (Figure 1-4), and the south and west areas, located immediately to the south and west of the site (Figure 1-3).

The northwest area is predominantly composed of single-family residences located within the floodplain of Bound Brook and adjacent to the non-developed corridor of Bound Brook (i.e., Bound Brook Corridor), which primarily consists of palustrine wetlands. Fragments of broad-leaved deciduous forests were observed sporadically throughout the north area, adjacent to the Conrail ROW, and between the residential properties and the Bound Brook Corridor.

The south and west areas consist predominantly of single-family residences characterized by manicured lawns with ornamental shrubs and trees. Several large mowed fields were also present at Roosevelt School and along Tremont and Harvard Avenues. Fragmented forests were present within the eastern and southeastern portion of the south area, and two areas of fallow, or successional, fields were present within the eastern portion of the south area.

Wildlife Assessment

A qualitative survey of wildlife resources within the off-site properties was performed during the terrestrial habitat assessment. Direct and indirect wildlife observations of amphibians, reptiles, birds, and mammals were recorded during the assessment. A total of 22 bird and three mammal species were observed on and adjacent to the off-site properties (see Table 1-2).

Endangered Species and Others of Special Concern

Requests for information regarding the presence of endangered and threatened species were submitted to the New Jersey Department of Environmental Protection (NJDEP) - Natural Heritage Program and the United States Fish and Wildlife Service (USFWS). A 13 December 2000 response from NJDEP identified the presence of migrant loggerhead shrike (*Lanius ludovicianus migrans*) within the immediate vicinity of the Bound Brook Corridor (Breden, 2000). The documented shrike sighting was within a riparian forest along a floodplain tributary of the Bound Brook. Loggerhead shrikes prefer open fields and scrubby clearings with thickets and hedgerows having trees and shrubs with thorns, which are used to impale larger prey (Andrle and Carroll, 1988). Habitat for the loggerhead shrike is not present on or adjacent to the off-site properties. The response from the USFWS (Walsh and Staples, 2001) indicated that except for an occasional transient bald eagle (*Haliaeetus leucocephalus*), no federally listed or proposed threatened or endangered flora or fauna under the USFWS's jurisdiction are known to occur within the vicinity of the site.

Floodplain Assessment

Portions of the off-site properties are located within the 100-year and 500-year floodplains of the Bound Brook and Cedar Brook (a tributary to the Bound Brook), as depicted on the New Jersey Flood Insurance Rate Maps for the Borough of South Plainfield (FEMA, 1980; 1988). In addition, portions of the off-site properties are located in the flood hazard area of Bound Brook and Cedar Brook, as depicted on the NJDEP Delineation of Floodway and Flood Hazard Area Map for Bound Brook and Cedar Brook. The floodplain of Cedar Brook was considered because some of the off-site properties lie within the floodplain of this stream. Within the northwest area, the entire area investigated is within the 100-year and 500-year floodplains, and most of the investigation area is within the flood hazard area limit. A small portion of the south area, located within the southeast portion of this area, is located within the flood hazard area, and the 100-year and 500-year floodplains. The west area is not located in the flood hazard area, or the 100-year and 500-year floodplains.

In June 1999, an investigation was conducted in four areas of the Bound Brook floodplain. These areas were denoted Area 1 (Veteran's Memorial Park), Area 2 (north side of Cedar Brook, between Lowden and Oakmoor Avenues), Area 3 (north side of Bound Brook, in the vicinity of Fred Allen Drive), and Area 4 (located adjacent to stream 14-14-2-3, south of New Market Avenue). The investigation methodology and results are presented in the *Floodplain Soil/Sediment Sampling and Analysis Summary Report*, dated January 2000 (Weston, 2000). See Figure 1-4 and Table 1-3 for additional information on the investigation locations and results.

1.2.1.8 Land Use and Demography

According to the 2000 Census, South Plainfield has a population of approximately 21,810 people (Bowman, 2001). The total land area is 8.31 square miles, and the total amount of surface water is about 0.04 square miles (SPEC, 1990). The town is unevenly divided by the Conrail Railroad ROW. The site is located in the southern portion of South Plainfield, which is largely industrial with some commercial and residential sections. The northern portion of the town is comprised primarily of residential development, with some commercial and limited industrial development.

In June 2001, THP, Inc., on behalf of the Borough of South Plainfield Planning Board, submitted a report entitled *The Designation of Certain Lands in the Vicinity of the Hamilton Boulevard Industrial Site as a Redevelopment Area* (THP, 2001). This report was prepared pursuant to Resolution #01-116 adopted by the South Plainfield Planning Board on 19 April 2001 and discusses the results of a preliminary investigation to determine whether certain lands in the vicinity of the site should be designated as a "Redevelopment Area" in accordance with the Local Redevelopment and Housing Law (N.J.S.A.40A:12A-2 et seq.).

1.2.2 Site and Off-Site Properties History

1.2.2.1 Site History

Cornell-Dubilier Electronics manufactured electronic components, including capacitors, at the site from 1936 through 1962. It has been reported that the company also tested transformer oils for an unknown period of time. Polychlorinated biphenyls (PCBs) and chlorinated organic degreasing solvents such as trichloroethene (TCE) were used in the manufacturing process, and it has been alleged that during Cornell-Dubilier Electronics' period of operations, the company disposed of PCB-contaminated materials and other hazardous substances at the site. A former employee has claimed that the rear of the property was saturated with transformer oils and that capacitors were also buried behind the facility during the same time period (EPA, 1996).

1.2.2.2 Off-Site Properties History

Residential streets in the vicinity of the Cornell-Dubilier Electronics site began undergoing development in the early 1900s. Plat maps obtained from the Borough of South Plainfield Building and Engineering Department show planned residential lot development on the southeast portions of Jackson, Harvard, and Tremont Avenues in 1908, with additional lots platted in 1910. The 1910 plat map also shows planned lot development along Plainfield Avenue (now Hamilton Boulevard), Hancock and Eliott (now Bergen) streets. The May 1917 plat map of the Plainfield Terrace subdivision (Sections Two and Three) shows planned lot development on Kosciusko, Arlington, Delmore, Spicer, Garibaldi, Kenneth, and Belmont Avenues. Additional development of these streets is shown in the July 1920 plat for Section Four of Plainfield Terrace. Development of Lowden and Oakmoor Avenues is first documented in the April 1926 plat map of the Brookside Manor subdivision. The most recently developed streets, Schillaci Lane and Fred Allen Drive, were initially platted in June 1956 as part of the Glendale Homes subdivision.

Aerial photographs of the residential areas south and west of the site show sparse development from 1940 through 1954. Homes were present primarily along Hancock Street, and Belmont and Arlington Avenues. From 1957 through 1970, development in this area consisted primarily of additional homes along Bergen Avenue and sporadic additional housing development west and south of the site. Through the 1970's and 1980's, additional development continued south and west of the site. By 1984, these areas were largely developed to the current extent.

1.2.2.3 Previous Investigations

Sampling conducted at the site by the EPA revealed elevated concentrations of contaminants in site soils and on-site buildings, and surface waters and sediments of the Bound Brook adjacent to the site. These findings resulted in the investigation of off-site areas. These areas included the Bound Brook and its associated floodplain downstream of the site; New Market Pond; Spring Lake; and residential, commercial, and municipal properties in the vicinity of the site. A summary of the sampling and analytical programs conducted on residential, commercial, and municipal properties in the vicinity of the site prior to the OU-1 RI is provided in Table 1-3. Off-site investigations at residential properties identified the presence of PCBs, frequently at elevated concentrations, in soils and in-house dust at several residences near the site. As discussed in the Remedial Investigation

Report for OU-1, based on sampling conducted by the EPA removal program, it was determined that residences would only be sampled for PCBs during the RI.

To date, several actions have been taken to limit the off-site migration of contaminants to residential properties, and reduce the potential for residential exposure to contaminants. A summary of these actions is provided in Table 1-4. In addition, an ongoing removal action is being conducted at an additional property, and is scheduled to be completed by the end of 2001.

1.2.3 Nature and Extent of Contamination

The nature and extent of contamination at the off-site properties of the site as summarized in this section is based on the data presented in the Remedial Investigation Report for OU-1.

1.2.3.1 Matrix-Specific ARARs and TBCs

Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requires that the Applicable or Relevant and Appropriate Requirements (ARARs) of all federal and state environmental laws be considered in the planning of remedial actions. EPA's primary guidance on ARARs (CERCLA Compliance with Other Laws Manual, OSWER Directive 9234.1; EPA, 1998) indicates that, where possible, the potential adverse effects of a hazardous waste site should be assessed by comparing chemical concentrations observed in environmental media at or near the site and at potential receptor locations with ARARs or with other guidances developed to protect human health and/or the environment. By EPA definition, applicable requirements refer to cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, or other circumstance at a CERCLA site. In addition to ARARs, To Be Considered criteria (TBCs) may be considered as part of the site Risk Assessment and may be used in determining the necessary cleanup for the protection of health or the environment. TBCs are defined as non-promulgated advisories or guidance issued by state or federal government that are not legally binding and do not have the status of potential ARARs. ARARs for soils are presented in Section 3.1.1. TBCs are also discussed in this section.

1.2.3.2 Soils

Soil sampling was conducted at 19 properties and 13 ROWs in the vicinity of the Cornell-Dubilier Electronics site during the OU-1 RI. Shallow (0 to 2 inches bgs) and deeper (between 4 and 18 inches bgs depending on property/ROW) surface soils were collected from 19 individual properties and along 13 ROWs to further delineate the extent of off-site soils contamination. A total of 807 environmental soil samples were collected during the RI. Table 1-5 summarizes the Aroclors detected in the soil samples collected from each of the 19 properties during the RI. Properties 1, 13 and 18, which were identified in the RI as requiring consideration in the FS, are highlighted on Table 1-5.

The results from the RI also indicated that the following ROWs had at least one sample exceeding the EPA Soil Screening Level (SSL) of 1 milligram/kilogram (mg/kg) Total PCBs:

- Property 21 (ROW of Kenneth Avenue)
- Property 25 (ROW of Kosciusko Avenue)
- Property 27 (ROW of Harvard Avenue)
- Property 29 (ROW of Hancock Street)
- Property 30 (ROW of Bergen Street)

The locations of RI samples exceeding the SSL are highlighted on Figure 1-5.

In addition to the soil data collected during the RI for OU-1, soil sampling of off-site properties was performed by the EPA in 1997 and 1998 (Table 1-3). EPA conducted surface (0 to 2 inches bgs) soil sampling for PCBs at off-site properties in phases. These data are summarized in Table 4-1 in the Remedial Investigation Report for OU-1 (Foster Wheeler Environmental, 2001a). The locations of samples from earlier investigation (i.e., pre-RI) that had PCB concentrations above the SSL are also highlighted on Figure 1-5. Based on the ROW samples collected both before and during the RI, it is possible that additional areas of contamination may be present within the study area. Figure 1-6 depicts the extent of the study area where additional areas of contamination may be present. Additional investigation of properties within the study area may be performed during the pre-design investigation; additional areas of contamination identified, if any, may be included in the remedial design and remedial action.

1.2.4 Contaminant Fate and Transport

The migration of PCBs from the off-site properties into air via the entrainment of contaminated soil particles by wind (i.e., fugitive dust emissions) is expected to occur in only limited areas. In general, the off-site properties currently have sufficient surface cover/vegetation to reduce the potential for any airborne dust; however, the importance of this route of migration increases for any area of exposed soil (current and/or future), such as the Department of Public Works yard area. This transport mechanism is likely the principal means by which the properties in the vicinity of the site became contaminated. The lack of vegetation in certain areas of the site may have enabled contaminated soil to blow into residential, commercial, and municipal areas. In addition, travel by vehicles on the dirt and gravel roadways present on the site prior to 1997, and then off-site, may have deposited contaminated soil particles on nearby roadways, where surface water runoff possibly further transported the particles to the surface of the adjacent property areas.

The migration of PCBs from the off-site properties to and within transitory impounded surface water is not a principal environmental transport mechanism. Migration of PCB-adsorbed soil particles via surface water runoff is expected to occur only when the water flow generated by a storm event is sufficiently high, since the amount of surface cover on the off-site properties substantially limits the entrainment of soil particles. However, once entrained in the runoff, transport and/or deposition of these soil particles would occur within the storm sewer system, on other property areas, and/or within the Bound Brook and its associated wetlands.

The migration of PCBs to underlying subsurface soils and bedrock groundwater by the percolation of rainwater through contaminated soils are not primary migration routes, based on the physiochemical characteristics of PCBs (i.e., their high adsorptive affinities and low aqueous solubilities) and the analytical data collected during the OU-1 RI sampling, which showed a general solubilities) and the analytical data collected during the OU-1 RI sampling, which showed a general decrease in concentration for the deeper surface soils. The importance of these routes of migration would increase only by the presence of other, more mobile organic compounds to act as co-solvents.

PCBs bioaccumulate significantly in aquatic organisms. However, as aquatic habitat is not present on the off-site properties sampled during the OU-1 RI, the importance of bioaccumulation decreases as a viable fate/transport route for detected PCBs in the off-site soils.

1.2.5 Baseline Risk Assessments

The approach taken in preparing the baseline human health risk assessment (BHHRA) was to employ EPA-approved exposure models, coupled with conservative assumptions about exposure conditions, to generate screening-level reasonable maximum case estimates of the baseline (assuming no further remedial action) health risks associated with chemical contamination of environmental media.

Contaminants of potential concern (compounds and chemical classes for which a quantitative risk assessment was performed) were identified for soil on the basis of their frequency of occurrence, levels of occurrence, demonstrated relationship to site activities, local and regional background levels, a toxicity/concentration screen, and availability of toxicological parameters for risk assessment.

Reasonable maximum and average case exposure scenarios were developed using the 95% UCL contaminant concentration, combined with conservative but realistic pathways of exposure. Average case scenarios were developed for those reasonable maximum case scenarios exceeding a 1 x 10^{-4} potential carcinogenic risk and/or hazard index (HI) of 1.0 for non-carcinogenic risk. Exposure pathways chosen for quantitative analysis at this site included the following:

- Incidental soil ingestion by adult, child, and integrated residents; and
- Dermal absorption of chemicals in soil by child, adult, and integrated residents.

Results of the risk assessment indicate that the non-cancer HI for adult residents was above the EPA benchmark value of 1.0 for Properties 13 and 18. The non-cancer HI was 4 for the Reasonable Maximum Exposure (RME) case and 2 for the Central Tendency (CT) case for Property 18. The RME case for Property 13 exceeded the benchmark value of 1 (2.0); however, the CT case did not. The cancer risk for adult residents was within the risk range of 10^{-4} and 10^{-6} for four properties (Properties 1, 2, 13, and 18) for the RME case and two properties (Properties 13 and 18) for the CT case.

For child residents, the non-cancer HI was above the EPA benchmark value of 1.0 for three properties (Properties 1, 13, and 18) for the RME case, with HI values ranging from 2 to 36, and two properties (Properties 13 and 18) for the CT case, with HI values of 6 and 15, respectively. The cancer risk for child residents was within the risk range of 10^{-4} and 10^{-6} for four properties for the RME case (Properties 1, 2, 11, and 13), and for two properties for the CT case (Properties 13 and 18). For the RME case, Property 18 had a total cancer risk estimate above the upper EPA benchmark value of 10^{-4}.

For the integrated resident, the results of the risk assessment indicate that one additional property, Property 3, would exceed the lower benchmark value, but not exceed the upper benchmark value.

An Ecological Risk Assessment (ERA) was performed to assess potential risks to terrestrial receptors from contaminants found exclusively in the surface soils of off-site properties in the vicinity of the Cornell-Dubilier Electronics site. Using conservative assumptions, the ERA considered multiple receptors and trophic levels from the potential terrestrial communities associated with off-site properties. Representative ecological communities or specific wildlife species evaluated included soil invertebrates and microbial process, plants and representative small mammals, and birds. Exposure pathways chosen for quantitative analysis at this site included the following:

- Exposure via incidental ingestion of soil; and
- Dietary exposure pathway (PCB exposure from dietary sources to the identified receptors).

The ecological risk assessment evaluation determined that bioaccumulative effects from PCBs at the off-site properties appear to represent low potential risks to wildlife species which may utilize these marginal areas. This is due to the lack of significant habitat at most of the properties and non-exceedance of a definitive endpoint for insectivorous birds and mammals and herbivorous mammals in the context of a receptor-specific exposure assessment.

1.2.6 Completed Remedial Actions

In response to the levels of PCBs that were detected during soil and dust sampling conducted in 1997 and 1998 by the EPA, removal actions have previously been performed on several off-site properties. These removal actions are summarized in Table 1-4. A detailed discussion of these actions are provided in the Remedial Investigation Report for OU-1 (Foster Wheeler Environmental, 2001a). The properties sampled during the OU-1 RI have not been the subject of prior soil removal actions.

SECTION 1

TABLES

TABLE 1-1

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
MEAN MONTHLY TEMPERATURE AND PRECIPITATION
FOR SOUTH PLAINFIELD, NEW JERSEY

Month	Mean Temperature (°F)	Mean Precipitation (inches)
January	29	3.5
February	32	3.1
March	42	4.0
April	51	4.1
May	62	4.6
June	70	3.7
July	75	5.2
August	74	4.7
September	66	4.3
October	55	3.6
November	45	4.2
December	34	3.9

Source: Weather Channel, 2001

TABLE 1-2

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
WILDLIFE OBSERVATIONS WITHIN THE OFF-SITE PROPERTIES

Common Name	Scientific Name	Area Observed[1]	Field Notes
Birds			
Red-Winged Blackbird	*Agelaius phoeniceus*	Section 3	Observed in Bound Brook Corridor adjacent to residential areas
Canada Goose	*Branta canadensis*	Section 1 and 2	Observed individuals in mowed fields at Roosevelt School
Northern Cardinal	*Cardinalis cardinalis*	Section 3	Individuals observed and heard call
Gray Catbird	*Dumetella carolinensis*	Section 1, 2 and 3	Individuals observed
Northern Mockingbird	*Mimus polyglottos*	Section 1, 2 and 3	Individuals observed and heard call
Song Sparrow	*Melospiza melodia*	Section 1 and 2	Heard call
House Sparrow	*Passer domesticus*	Section 1, 2 and 3	Individuals observed
Purple Finch	*Carpodacus purpureus*	Section 1, 2 and 3	Individuals observed
Tufted Titmouse	*Parus bicolor*	Section 1, 2 and 3	Heard call
American Robin	*Turdus migratorius*	Section 1, 2 and 3	Individuals observed and heard call
American Crow	*Corvus brachyrhynchos*	Section 1, 2 and 3	Individuals observed and heard call
Northern Flicker	*Colaptes auratus*	Section 1, 2 and 3	Individuals observed and heard call
Swallow		Section 3	Individuals observed flying over residential areas
Great Blue Heron	*Ardea herodias*	Section 3	Individual observed flying over residential area
Common Grackle	*Quiscalus quiscula*	Section 1, 2 and 3	Individuals observed and heard call
European Starling	*Sturnus vulgaris*	Section 1, 2 and 3	Individuals observed and heard call
Brown-headed Cowbird	*Molothrus ater*	Section 3	Individual observed with flock of starlings
Mourning Dove	*Zenaida macroura*	Section 1, 2 and 3	Individuals observed and heard call
Blue Jay	*Cyanocitta cristata*	Section 1 and 2	Individuals observed and heard call
Red-bellied Woodpecker	*Melanerpes carolinus*	Section 3	Heard call
Downy Woodpecker	*Picoides pubescens*	Section 3	Heard call
Rock Dove	*Columba livia*	Section 1 and 2	Observed individuals
Mammals			
White-tailed Deer	*Odocoileus virginianus*	Section 1	Observed individual in forested lot
Eastern Gray Squirrel	*Sciurus carolinensis*	Section 1, 2 and 3	Individuals observed
Eastern Cottontail	*Sylvilagus floridanus*	Section 1, 2 and 3	Individuals observed

[1] Area Observed

Section 1 - Residential Area to south of site, including: Spicer, Delmore, Arlington, Kosciusko, Tremont, Jackson and Harvard Avenues, Hamilton Boulevard, Belmont Avenue, and Roosevelt School .

Section 2 - Residential Area to west of site, including: Bergen Street and Hancock Avenue.

Section 3 - Residential Area to northwest of site, including: Schillaci Lane, Fred Allen Drive, and Oakmoor and Lowden Avenues.

TABLE 1-3 (Sheet 1 of 3)

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
CHRONOLOGY OF PREVIOUS INVESTIGATIONS

Date	Action Taken
26 and 27 June 1997	EPA collected 20 surface soil samples and a field duplicate sample from residential properties adjacent to the site, and the investigation is summarized in a Sampling Trip Report, dated 7 July 1997 (Weston, 1997c), and two data package transmittals, dated 4 August 1997 (Weston, 1997a; 1997b). The soil samples were analyzed for PCBs, lead, and cadmium. Detected concentrations ranged up to 4.8 mg/kg for Aroclor-1254, up to 291 mg/kg for lead, and up to 2.3 mg/kg for cadmium.
27 through 30 October 1997	EPA collected surface soil samples (0 to 2 inches in depth) from the following residential properties: 130 Spicer Avenue, 501 Garibaldi Avenue, 500 Garibaldi Avenue, 320 Spicer Avenue, 204 Spicer Avenue, 210 Spicer Avenue, 214 Spicer Avenue, 336 Spicer Avenue, 305 Spicer Avenue, 507 Hamilton Boulevard, 311 Delmore Avenue, 228 Spicer Avenue, 233 Delmore Avenue, 501 Hamilton Boulevard, 108 Spicer Avenue, and 345 Metuchen Road. Aroclor-1254 and Aroclor-1260 concentrations as high as 22 mg/kg and 2.2 mg/kg, respectively, were measured in these "Tier I" soil samples. The results are summarized in the *Tier I Residential Sampling and Analysis Summary Report*, dated 25 June 1998 (Weston, 1998e).
17 and 18 November 1997	EPA collected interior dust samples from residential properties, and the results are provided in the *Final Report, Vacuum Sampling*, dated February 1998 (Weston, 1998f). Sampled properties included residences on Hamilton Boulevard (one), Spicer Avenue (eight), Garibaldi Avenue (two), and Delmore Avenue (one). Aroclor-1254 and Aroclor-1260 concentrations as high as 120 mg/kg and 85 mg/kg, respectively, were measured in the dust samples.
20 through 23 April 1998	EPA conducted "Tier II" soil sampling at the following residential properties: 127 Delmore Avenue, 135 Delmore Avenue, 201 Delmore Avenue, 221 Delmore Avenue, 207 Delmore Avenue, 403 Hamilton Boulevard, 237 Delmore Avenue, 115 Delmore Avenue, 131 Delmore Avenue, 215 Delmore Avenue, 346 Hamilton Boulevard, 511 Hamilton Boulevard, 119 Delmore Avenue, 229 Delmore Avenue, and 123 Delmore Avenue. Maximum PCB concentrations were 60 mg/kg for Aroclor-1254 and 4.6 mg/kg for Aroclor-1260. Results of the investigation are presented in the *Tier II Residential Sampling and Analysis Summary Report*, dated 2 July 1998 (Weston, 1998c).
21 through 28 April 1998	EPA conducted vacuum sampling in residential properties on Hamilton Boulevard (twelve), Delmore Avenue (fifteen), Forest Haven Boulevard (one), Garibaldi Avenue (two), and Spicer Avenue (six). These dust samples contained Aroclor-1242, Aroclor-1254, and Aroclor-1260, and detected PCB concentrations ranged from 0.11 to 27 mg/kg. The *Final Report, Vacuum Dust Sampling* (July 1998) summarizes the results of this investigation (Weston, 1998d).

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
CHRONOLOGY OF PREVIOUS INVESTIGATIONS

Date	Action Taken
4 and 5 May 1998	EPA conducted "Tier III" soil sampling at four residential property areas in the vicinity of the site, and the results are summarized in the *Tier III Residential/Neighborhood Sampling and Analysis Summary Report,* dated 10 July 1998 (Weston, 1998b). Sampling was typically conducted at approximately 100-foot intervals along the area roadways. Area 1 was defined as the block of land bounded by Delmore Avenue, Belmont Avenue, Arlington Avenue, and Hamilton Boulevard. Thirty-nine surface soil samples were collected for PCB analysis from the following residential roadways: Hamilton Boulevard, Arlington Avenue, Delmore Avenue, Garibaldi Avenue, and Fulton Street. Aroclor-1254 concentrations ranged from 0.027 to 2.9 mg/kg. Aroclor-1260 concentrations ranged from undetected to 0.64 mg/kg. Fifteen surface soil samples were collected within Area 2, defined as the northeast side of Delmore Avenue, between Fulton Street and Belmont Avenue. Soil samples were collected for PCB analysis from Belmont Avenue and Delmore Avenue. Concentrations of Aroclor-1254 ranged from 0.022 to 1.5 mg/kg, and Aroclor-1260 concentrations ranged from undetected to 0.75 mg/kg. Area 3 was defined as the south side of Belmont Avenue, between Arlington Avenue and Metuchen Road. Ten surface soil samples were collected for PCB analysis from the following roadways: Arlington Avenue, Delmore Avenue, and Belmont Avenue. Concentrations of Aroclor-1254 ranged from 0.085 to 0.93 mg/kg. Aroclor-1260 concentrations ranged from undetected to 0.14 mg/kg. Ten surface soil samples were collected for PCB analysis from residential properties in Area 4, defined as the southeast side of Hancock Street, between Lakeview and Amboy Avenues. Aroclor- 1254 concentrations ranged from 0.037 to 1.2 mg/kg, and Aroclor-1260 concentrations ranged from 0.017 to 0.2 mg/kg.

TABLE 1-3 (Sheet 3 of 3)

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
CHRONOLOGY OF PREVIOUS INVESTIGATIONS

Date	Action
26 through 28 October 1998	EPA collected indoor wipe samples at 13 businesses located adjacent to the site, along Hamilton Boulevard and Spicer Avenue. No PCBs were detected in these wipe samples. In addition, EPA collected one to two surface soil samples from five of these commercial properties, where soil was available for sampling. The five properties included 417 Hamilton Boulevard, 321 Spicer Avenue, 405 Spicer Avenue, 408 Hamilton Boulevard, and 340 Hamilton Boulevard. Aroclor-1254 was detected at concentrations between 0.12 and 7.1 mg/kg. Five residential properties in the vicinity of the site, along Delmore Avenue, Spicer Avenue, and Hamilton Boulevard, were vacuum sampled by EPA. Weathered Aroclor-1254 was present at concentrations as high as 39 mg/kg. The results of the October 1998 sampling are presented in the *Final Report, Vacuum, Wipe and Soil Sampling*, dated December 1998 (Weston, 1998a).
14 November 1998	EPA collected 31 surface soil samples and 2 duplicate samples from Property FF located on Spicer Avenue (referred to as "Addendum to Tier I") and presented in a 16 February 1999 report, *Tier I Residential Sampling and Analysis Summary Report, Addendum No. 1* (Weston, 1999).
21 through 23 June 1999	Samples from the Bound Brook floodplain, downstream of the site, were collected by EPA and analyzed for PCBs. Four areas were sampled: Area 1 (Veteran's Memorial Park), Area 2 (north side of Cedar Brook, between Lowden and Oakmoor Avenues), Area 3 (north side of Bound Brook, in the vicinity of Fred Allen Drive), and Area 4 (located adjacent to stream 14-14-2-3 as identified on the Flood Insurance Map for the Township of Piscataway, south of New Market Avenue and east of Highland Avenue). The investigation results are presented in the *Floodplain Soil/Sediment Sampling and Analysis Summary Report*, dated January 2000 (Weston, 2000). Area 1 samples had total PCB concentrations ranging from non-detect to 25 mg/kg, Area 2 samples had total PCB concentrations ranging from 0.060 mg/kg to 2.0 mg/kg, Area 3 samples had total PCB concentrations ranging from 2.5 mg/kg to 7.5 mg/kg, and Area 4 samples had total PCB concentrations ranging from non-detect to 0.21 mg/kg.

TABLE 1-4

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
CHRONOLOGY OF RESPONSE ACTIONS BY LOCAL, STATE, AND FEDERAL AGENCIES

Date	Nature of Response
25 March 1997	A unilateral administrative order was issued to the current owner of the Hamilton Industrial Park, D.S.C. of Newark Enterprises, Inc., which required that a removal action be taken to stabilize the site. The scope of work included paving facility driveways and parking areas, installing security fencing and warning signs to limit access to the site, and installing silt fencing to limit off-site migration of surface soils.
29 March 1998	EPA initiated a removal action to clean the interiors of homes where PCBs were found in indoor dust at levels of potential health concern.
6 August 1998	Cornell-Dubilier Electronics and D.S.C. of Newark Enterprises, Inc. entered into an Administrative Consent Order for a removal action that included removal and disposal of contaminated soil from five residential properties.
23 February 1999	EPA ordered the former owners, Cornell-Dubilier Electronics and Dana Corporation, to conduct a removal action at seven additional residential properties.
28 April 1999	A "Participate and Cooperate Order" was issued to D.S.C. of Newark Enterprises, Inc. and Federal Pacific Electric Company for the remediation of Tier II residential properties.
14 April 2000	EPA ordered D.S.C. of Newark Enterprises, Inc. to conduct a removal action of contaminated soils at 126 Spicer Avenue.

TABLE 1-5

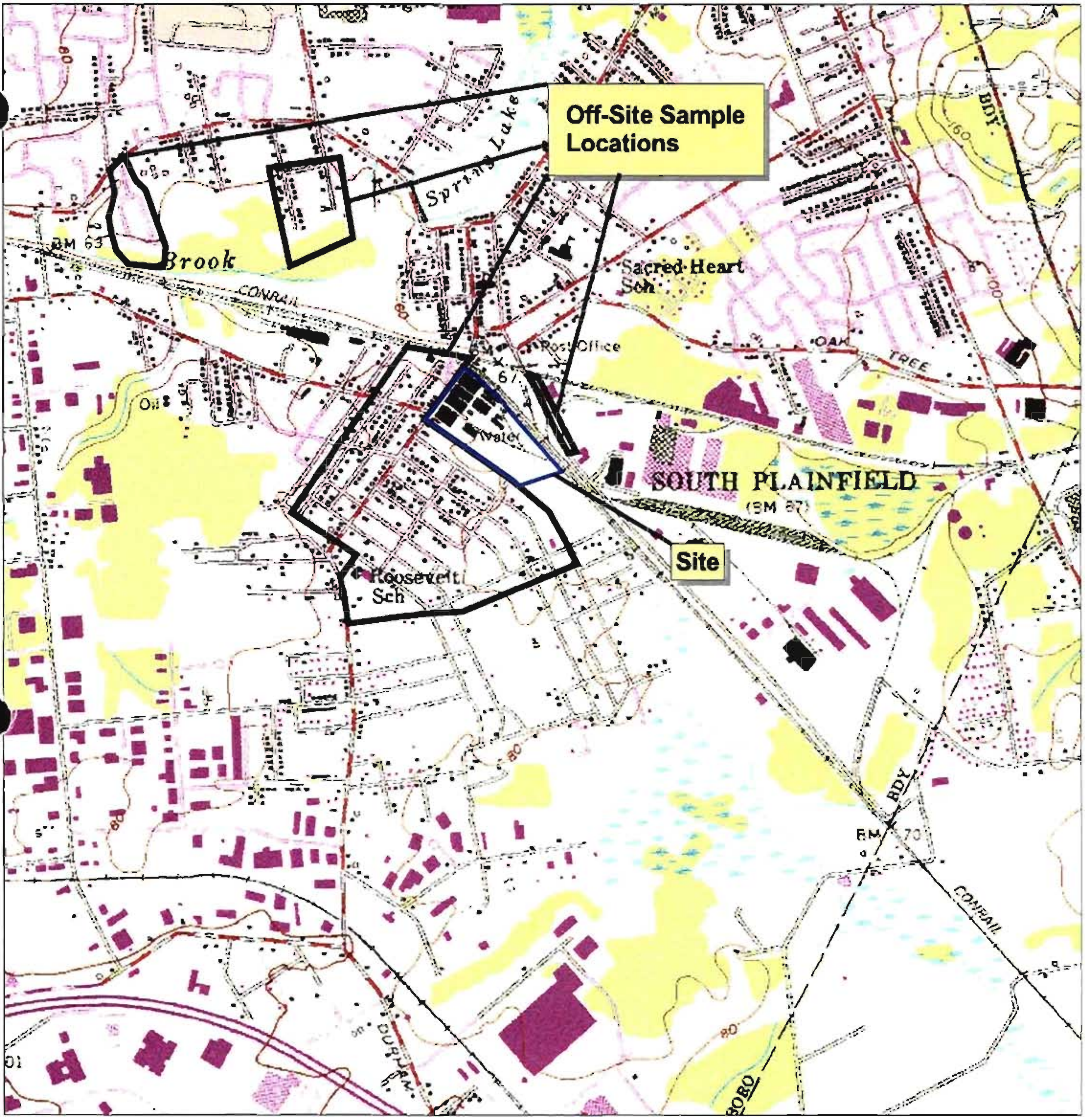
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
MINIMUM AND MAXIMUM CONCENTRATIONS (MG/KG) OF AROCLORS DETECTED IN OFF-SITE SOILS

Property Number	Property Address	Chemical	Minimum Concentration	Maximum Concentration
1	**408 Hamilton Boulevard**	**Aroclor-1254**	**0.014**	**6.1**
2	Block 256, Lots 9/10/11 (along Spicer Avenue)	Aroclor-1254	0.01	3.2
3	1126 Belmont Avenue	Aroclor-1254	0.018	0.63
4	405 Spicer Avenue	Aroclor-1254	0.043	0.45
5	210 Delmore Avenue	Aroclor-1254	0.019	0.23
6	221 Schillaci Lane	Aroclor-1260	0.024	0.033
7	301 Delmore Avenue	Aroclor-1254	0.015	0.42
9	230 Oakmoor Avenue	Aroclor-1254	0.046	0.085
10	251 Oakmoor Avenue	Aroclor-1254	0.026	0.67
11	334 Hancock Street	Aroclor-1254	0.042	0.56
12	Block 355, Lot 8 (Roosevelt School; along Jackson Avenue)	Aroclor-1254	0.01	0.26
13	**109 Arlington Avenue**	**Aroclor-1254** **Aroclor-1260**	**0.033** **0.031**	**0.28** **44**
14	233 Kosciusko Avenue	Aroclor-1254 Aroclor-1260	0.022 0.05	0.11 0.05
15	216 Kosciusko Avenue	Aroclor-1254 Aroclor-1260	0.0092 0.029	0.22 0.029
16	805 Belmont Avenue	Aroclor-1254	0.026	0.2
17	123 Delmore Avenue	Aroclor-1254 Aroclor-1260	0.027 0.09	0.96 0.09
18	**321 Spicer Avenue**	**Aroclor-1254**	**0.063**	**270***
19	Across from 405 Spicer Avenue	Aroclor-1254	0.005	0.33
20	429 Hancock Street	Aroclor-1254	0.039	0.23

NOTES:
NC – Not calculated. PCBs were not identified as a COPC at these properties.
* Maximum represents the average of duplicate samples (230 mg/kg and 310 mg/kg) collected at that location.
Bold entries indicate properties identified in the RI for remedial action.

SECTION 1

FIGURES

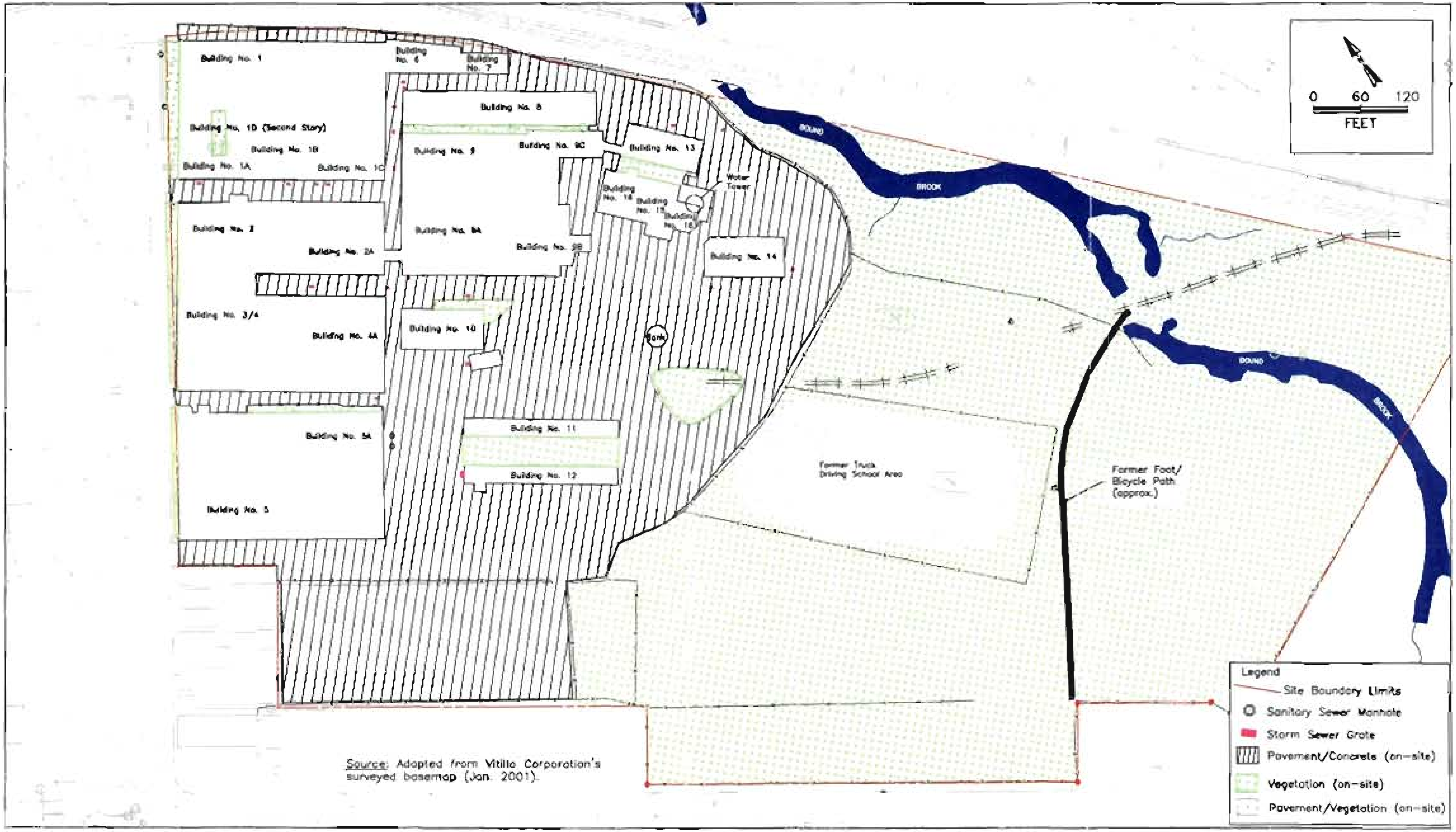


Source: US Geological Survey 7.5-minute topographic map for Plainfield, New Jersey.

Scale: 1: 25 000

N

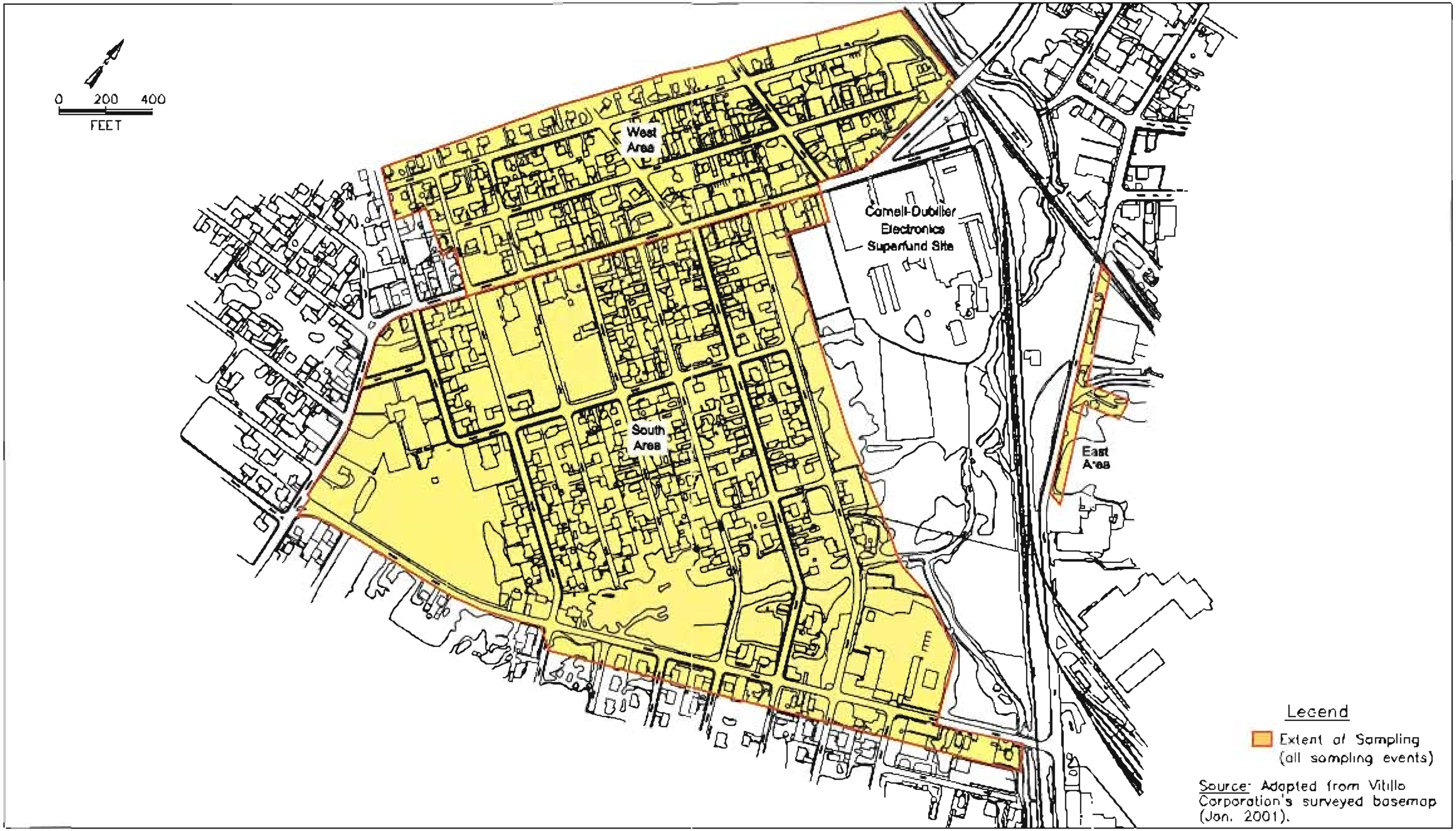
400037 FOSTER WHEELER ENVIRONMENTAL CORPORATION	Title: Site Location Map Cornell-Dubilier Electronics Superfund Site Off-Site Soils (OU-1) Feasibility Study Report	DWN: CTS CHKD: WSD DATE: 08/15/01	DES.: APPD: JH REV.: 1	Project No. 1945.1018 Figure No. 1-1



FOSTER WHEELER ENVIRONMENTAL CORPORATION

TITLE:
Site Map
Cornell-Dubilier Electronics Superfund Site
Off-Site Soils (OU-1) Feasibility Study Report

DWN.: CTS	DATE: 05/08/01	PROJECT NO. 1945.1018
CHKD: WSD	REV.: 0	FIGURE NO. 1-2
DES.:	APPD:	

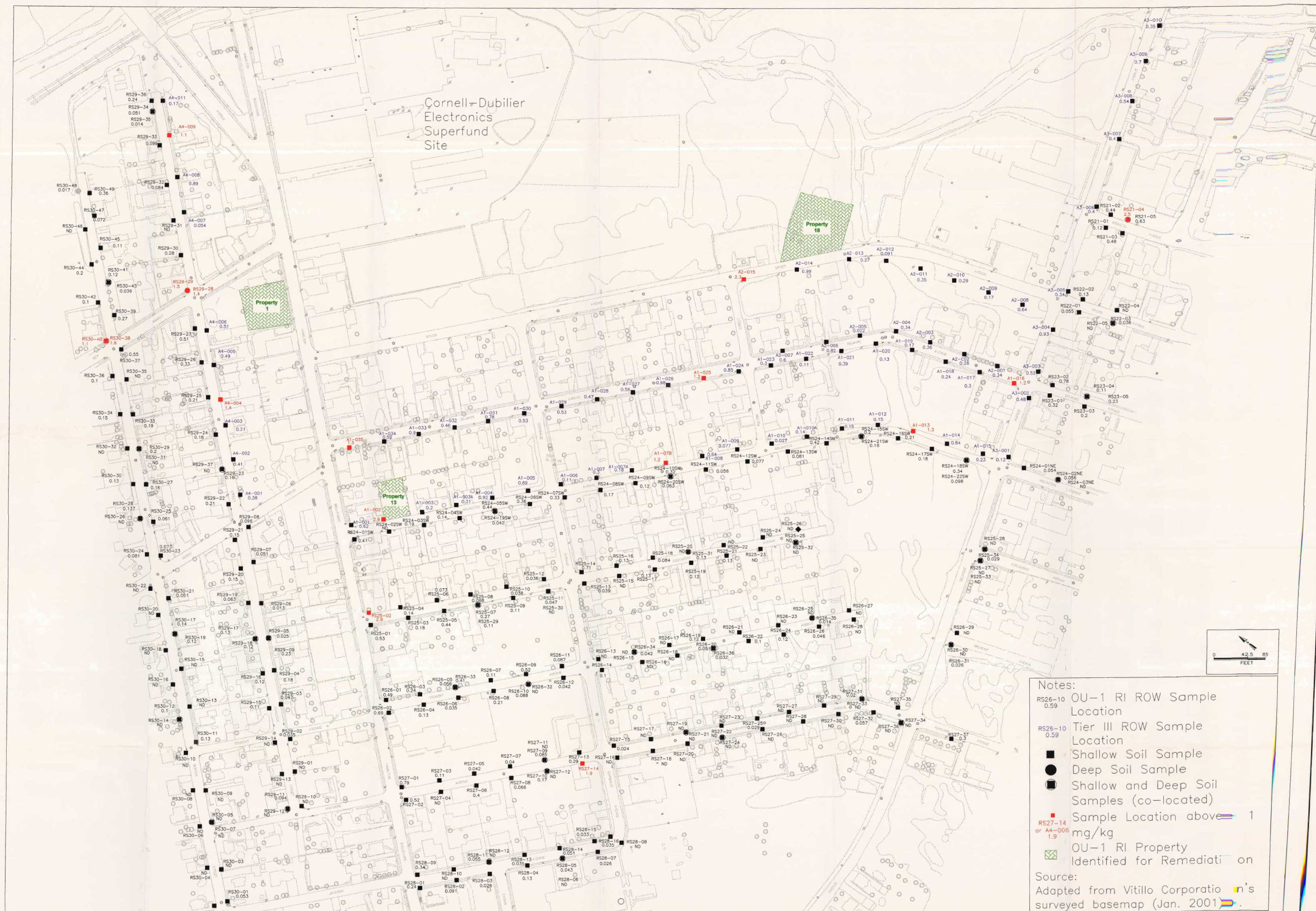


FOSTER WHEELER ENVIRONMENTAL CORPORATION

TITLE	DWN.: CTS	DATE: 08/15/01	PROJECT NO.: 1945.1018
Extent of Off-Site Soil Sampling Off-Site Properties - South, West, and East Areas Cornell-Dubilier Electronics Superfund Site, OU-1 Feasibility Study Report	CHKD: WSA	REV.: 1	FIGURE NO.: 1-3
	DES.:	APPD:	

FOSTER WHEELER ENVIRONMENTAL CORPORATION

TITLE:	DWN.	DATE:	PROJECT NO.
Extent of Off-Site Soil Sampling Off-Site Properties – Northwest Area Cornell-Dubilier Electronics Superfund Site, OU-1 Feasibility Study Report	CTS	08/15/01	1945.1018
	CHKD: WSD	REV	FIGURE NO.
	DES.	APPD:	1-4



FOSTER WHEELER ENVIRONMENTAL CORPORATION

TITLE:
Off-Site Properties Identified for Remediation or Potential Further Investigation
Cornell-Dubilier Electronics Superfund Site
Off-Site Soils (OU-1) Feasibility Study Report

DWN: LEN	DES.:	PROJECT NO.: 194 5.1018
CHKD: WSD	APPD:	FIGURE NO.: 1-5
DATE: 08/14/01	REV.: 2	

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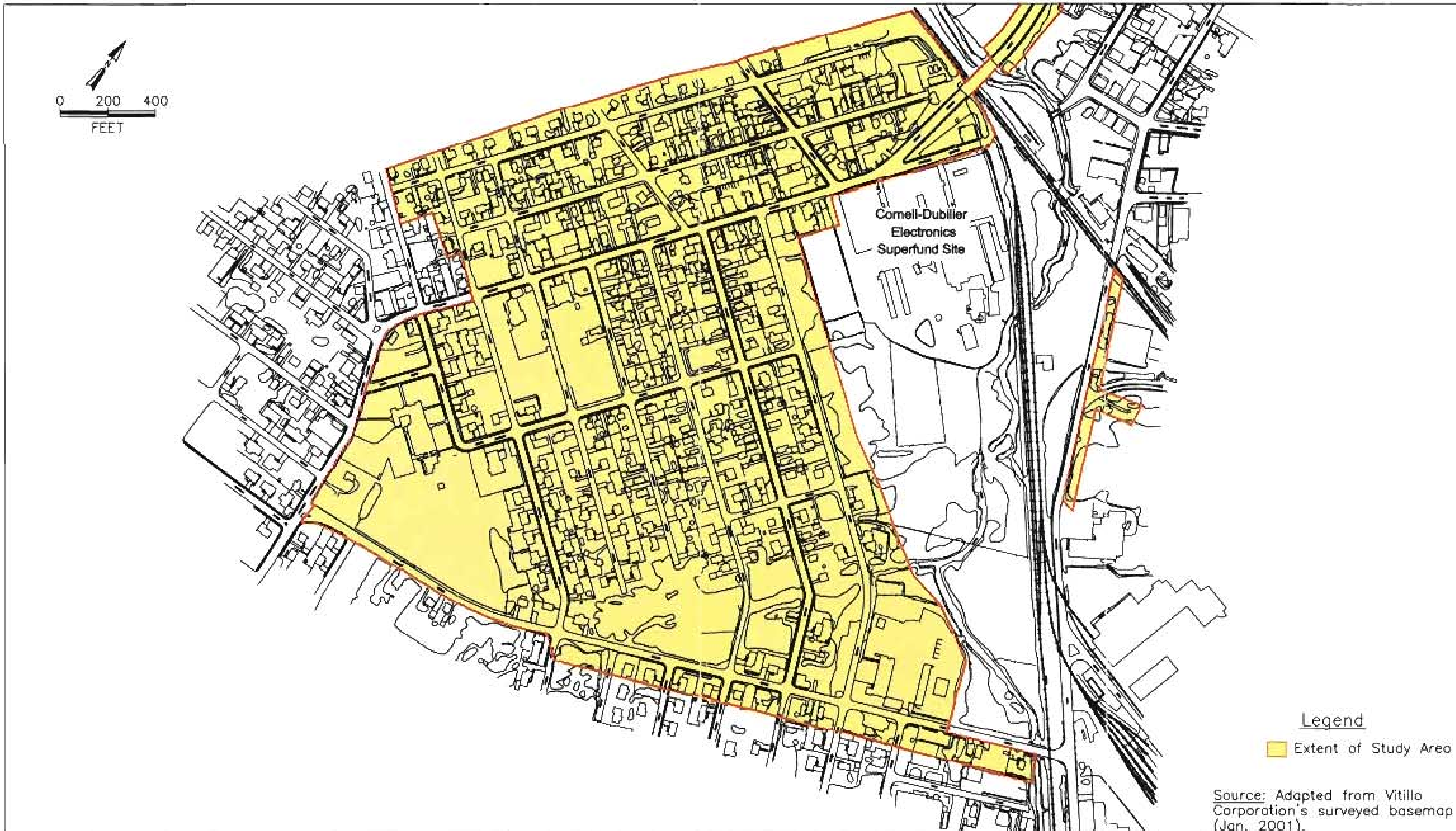

FOSTER WHEELER ENVIRONMENTAL CORPORATION	TITLE: Extent of Off-Site Study Area Off-Site Properties Cornell-Dubilier Electronics Superfund Site, OU-1 Feasibility Study Report	DWN.: CTS CHKD: WSD DES.:	DATE: 08/15/01 REV.: 0 APPD:	PROJECT NO.: 1945.1018 FIGURE NO.: 1-6

SECTION 2.0

2.0 IDENTIFICATION AND SCREENING OF TECHNOLOGIES

2.1 Introduction

The purpose of this section is to present the development of remedial action objectives (RAOs) and to identify, screen, and select the most appropriate technologies to address contaminated soil at the off-site properties. The most appropriate technologies or process options will be combined into remedial alternatives, screened in Section 3.0.

The screening of technologies consisted of five general steps, which are discussed below:

- Development of RAOs specifying the contaminants and media of interest, exposure pathways, and preliminary remediation goals that permit a range of treatment and containment alternatives to be developed. The preliminary remediation goals are developed on the basis of available chemical-specific ARARs, health-based risk and site-specific risk-related factors.

- Development of general response actions (GRAs) for PCBs in soil including engineering and institutional controls, removal, treatment, or other actions, singly or in combination, that may be taken to satisfy the RAOs for the site.

- Identification of volumes of contaminated soil, to which GRAs might be applied, taking into account the requirements for protection of human health and the environment as identified in the RAOs and the chemical and physical characterization of the site.

- Identification and screening of the technologies applicable to each general response action to eliminate those that cannot be implemented technically at the off-site properties and other potential areas of contamination. The GRAs are further defined to specify remedial technology types (e.g., the GRAs of treatment can be further defined to include physical, chemical, or biological technology types).

- Identification and evaluation of process options to select a representative process for each technology type retained for consideration. Although specific processes are selected for alternative development and evaluation, these processes are intended to represent the broader range of process options within a general technology type. Utilizing process options provides a greater flexibility in the final design while simplifying the FS process. During final design, any one of the process options within a technology type can be substituted for another, thereby providing a broader range of viable alternatives.

2.2 Remedial Action Objectives

RAOs aimed at protecting the environment must consider the chemicals of concern, exposure routes, receptors, and acceptable contaminant levels for each exposure pathway.

2.2.1 Chemicals of Concern

As discussed in the Remedial Investigation Report for OU-1 (Foster Wheeler Environmental, 2001a) and Section 1.2 of this report, PCBs, specifically Aroclor-1254 and Aroclor-1260, were identified as the chemicals of potential concern (COPCs) in the study area. The selection of Aroclor- 1254 and Aroclor-1260 as the COPCs was based on the validity of the analytical results from the RI and earlier sampling events, frequency of occurrence, concentrations relative to natural (background) levels, and/or toxicological, physical and chemical characteristics.

2.2.2 Allowable Exposure Based on Risk Assessments (including ARARs)

The human health and ecological risk assessments identified the potential for exposure of current and future human and environmental populations to site contaminants and the pathways through which they would potentially be exposed. To evaluate potential human health risks, exposure pathways were selected for which a quantitative risk could be estimated. The pathways and the associated risks were summarized in Section 1.2.5 of this report. Adult and child residents may be exposed to COPCs in the soils via the following exposure:

- Ingestion of surface soils by child and adult residents in the current and future use scenario; and
- Dermal contact by child and adult residents in the current and future use scenario.

Inhalation of surface soils was not considered a complete exposure pathway, based on consultation with the EPA Region 2 Risk Assessor (Foster Wheeler Environmental, 2001b).

EPA's June 1998 Toxic Substances Control Act (TSCA) rule for PCBs specifies a cleanup goal of 1 part per million (ppm) for unrestricted land use and EPA is using 1 ppm as its preliminary remediation goal (PRG).

2.2.3 Development of Remedial Action Objectives

Any remedial actions for contaminated soils must address the following RAOs, if human health risks and environmental concerns related to elevated contaminant concentrations in soil in the study area are to be addressed:

- Restore soil in areas of contamination to target cleanup levels; and
- Prevent public exposure to areas of contamination that present potential risks to human health and the environment.

2.3 General Response Actions

For the RAOs established in Section 2.2.3, potential GRAs were identified for remediation of the PCB-contaminated soil in the study area. The GRAs to address the RAOs for soil are No Action;

Limited Action; and containment, treatment, and disposal actions as specified in CERCLA, as amended.

No Action involves no remedial activities, but would assess conditions on a periodic basis. Limited Action would include engineering controls (e.g., capping, fencing), use restrictions and public information programs to educate the community about potential hazards at the impacted off-site properties.

Containment actions include technologies that involve little or no treatment, but provide protection of human health and the environment by reducing mobility of contaminants and risks of exposure through capping and other physical means (e.g., vertical barriers, grouting, etc).

Removal, treatment, and disposal actions include in-situ treatment, excavation, off-site treatment, and on and off-site disposal technologies, intended to reduce the toxicity, mobility, and/or volume of contaminated media.

2.4 Identification and Screening of Technology Types and Process Options

The screening of remedial technologies is performed in two steps: 1) identification and screening of technology types and process options, and 2) evaluation and selection of representative process options for each technology type retained. These two FS steps are discussed in the following sections.

2.4.1 Identification and Screening Criteria for Technologies

The remedial technology types associated with each of the GRAs typically considered for the cleanup of contaminated soil were developed from the *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA Interim Final* (EPA, 1988a), the *Technology Screening Guide for Treatment of CERCLA Soils and Sludges* (EPA, 1988c), the *Revised Handbook for Remedial Action at Waste Disposal Sites* (EPA, 1985), and experience on other hazardous wastes projects.

Remedial technology types associated with each GRA are identified in Table 2-1. Most of these remedial technology types contain several different process options that could apply to the contaminated soil. The screening of technology types and process options was based on technical implementability and effectiveness considering property conditions, contaminant types and concentrations as summarized in Section 1.2 of this report and the Remedial Investigation Report for OU-1(Foster Wheeler Environmental, 2001a).

2.4.2 Evaluation and Selection Criteria for Representative Process Options

Process options for the technically feasible actions were evaluated prior to selecting a particular process option to represent each technology type. In some cases, more than one process option was selected for a particular technology type if the process option data indicated sufficient differences in option performance. Process options were evaluated for effectiveness, implementability, and cost for each process by itself, not for the off-site properties as a whole, as described below:

- The evaluation of technology option effectiveness focused on: 1) effectiveness in handling the estimated areas or volumes of soil and the ability to meet contaminant reduction goals; 2) effectiveness of protecting human health and the environment during the construction and implementation phases; and 3) reliability of the technology with respect to contaminants and conditions of the off-site properties.

- The implementability evaluation consisted of an assessment of the technical and institutional feasibility of implementing a technology or process option. Since technical feasibility was used in technology type screening evaluation (Section 2.4.1), only institutional feasibility was considered in this evaluation.

- At this stage, cost evaluation was very preliminary and relied upon engineering judgement to arrive at the relative cost of process options within a technology type.

2.4.3 Screening of Soil Remediation Technologies

In the following section, potential remedial technologies are briefly described and summarized with the results of the initial screening. For those technologies which were not retained for further evaluation, the rationale for their elimination is included. The screening evaluations for each identified technology for contaminated soil are summarized in Table 2-2.

2.4.3.1 No Action

No Action is not a category of technologies but an approach that does not include implementation of any remedial measures and is included in the FS as a baseline remedial option as required by CERCLA (as amended). No Action includes five-year reviews of site conditions to assess future remedial actions if deemed necessary. The typical monitoring period is 30 years.

Initial Screening: No Action would not provide for any remedial action. Natural attenuation would be an insignificant contributor to any reduction in contaminant toxicity, mobility, or volume. The No Action alternative would not limit community exposure to the contaminants. Although No Action would not meet the remedial objectives, it is retained for further consideration as a baseline comparison with other alternatives.

2.4.3.2 Limited Action

Limited Action is also not a category of technologies, but a group of activities, which would not treat the contaminants in the soil but would restrict or minimize public exposure to contaminants. Limited Action includes public awareness programs and institutional controls, such as land use restrictions.

The Limited Action response includes engineering controls in addition to public awareness programs and institutional controls. Engineering controls could include installation of a cap constructed of a geotextile liner and sod ground cover in areas where the contaminated soils are located. Another option is the installation of fencing that would be installed surrounding the properties containing the contaminated soils, therefore restricting access to the property.

Initial Screening: Limited Action would not meet all the remedial objectives for the OU-1 FS, but it would potentially reduce public exposure to contaminated soil through engineering controls, institutional controls, and public information programs. Limited Action is therefore retained for further consideration.

2.4.3.3 Removal

This process involves the excavation of contaminated soils. This category employs typical construction equipment such as backhoes, bulldozers, front-end loaders, and draglines. Excavation is a preliminary or support technology and is often utilized in conjunction with numerous remedial actions, which first require removal of the contaminated soil.

Initial Screening: Excavation is required as the initial materials handling step in numerous remedial actions. One or more types of excavation equipment would be used in the excavation of contaminated soil for final treatment and/or disposal. Removal is therefore retained for further consideration.

2.4.3.4 Treatment Technologies

Treatment technologies are utilized to change the physical or chemical state of a contaminant or to destroy the contaminant completely, to reduce contaminant volume, toxicity, or mobility, and are included in this study due to the possibility of pre-disposal treatment requirements. Pre-disposal treatment may be necessary if contaminant concentrations in excavated soils exceed disposal facility limits for untreated soil.

Thermal Treatment

Thermal treatment is a technology category, which employs thermal energy to treat contaminated media and reduces contaminant volume, toxicity, and mobility. The process options included in this technology category are incineration, thermal desorption, and pyrolysis.

Incineration

Incineration is a thermally destructive method used to volatilize and combust (in the presence of oxygen) all forms of combustible waste materials and organic contaminants in soil. Incineration units such as multiple hearth, rotary kiln, infrared incineration, and fluidized bed incineration systems treat organic contaminants at high temperatures (1,200 °F to 2,400 °F). The destruction and removal efficiency (DRE) for properly maintained/operated incinerators exceeds the 99.99 percent requirement for hazardous wastes and can be operated at the 99.9999 percent DRE requirement for PCBs and dioxins.

Initial Screening: High temperature incineration is best suited for the destruction of volatile (VOC) and semi-volatile (SVOC) organics, PCBs, and pesticides in soil. Off-gases and combustion residuals generally require treatment. Incineration can be performed either by on-site mobile units or at off-site commercial facilities. Incineration is the best-demonstrated technology employed to remediate organic contaminants in soil and is therefore retained for further consideration.

Thermal Desorption

Thermal desoprtion is a physical separation process and is not designed to destroy organics in a contaminated media. Prepared soils are introduced into an enclosed heated chamber by a heated screw or belt conveyor. Direct or indirect heating methods are used to volatilize water and organic contaminants from soil. The off-gas containing the thermally stripped organics are then combusted in an afterburner or adsorbed in a carbon adsorption system designed to ensure complete removal of the contaminants. Typical operating temperatures for organic compound stripping are 400°F to 900°F.

Initial Screening: Thermal desorption or stripping is similar to the primary chamber of an incinerator but operates at much lower temperatures. Organics are volatilized from the soil effectively removing PCBs from soil. Thermal desorption is therefore retained for further consideration.

Pyrolysis

Pyrolysis is a chemical decomposition process, which is induced in organic materials by applying heat in the absence of oxygen. Organic materials are transformed into gaseous components and a solid residue (coke) containing fixed carbon and ash. In practice, pyrolysis is operated at less than stoichiometric quantities of oxygen, under pressure, and at operating temperatures above 800°F.

Initial Screening: Pyrolysis systems can be applicable for a number of organic materials that undergo a chemical decomposition in the presence of heat and has shown promise in treating organic contaminants in soils and sludges. Although a relatively new technology, treatment data does exist for PCBs. Therefore, this technology has been retained for further consideration.

Physical/Chemical Treatment

Physical/chemical treatment is a category of technologies which utilize chemical reactions or changes in chemical properties of contaminants to reduce their volume, toxicity, or mobility. This category of technologies includes dehalogenation, chemical extraction, soil washing, stabilization/solidification, and supercritical fluid extraction.

Dehalogenation

In dehalogenation, chemical reagents are added to soils contaminated with halogenated (chlorinated) organics in a heated slurry of reagents and soil. Dehalogenation is achieved by either the replacement of the halogen molecules or the decomposition and partial volatilization of the contaminants.

Initial Screening: The target contaminant groups for dehalogenation are halogenated SVOCs and pesticides. Alkali Metal Dechlorination (APEG) is one of the few processes other than incineration that has been successfully field tested in treating PCBs and is practical for small-scale applications. Therefore, dehalogenation has been retained for further consideration.

Chemical Extraction

Chemical extraction is a separation process, which does not destroy the waste in soils, but instead separates them from the medium. This separation process decreases the volume of waste that must be additionally treated or disposed. In chemical extraction, waste-contaminated soil and an extractant are mixed in an extractor, thereby dissolving the contaminants. The extracted solution is then placed in a separator, where contaminants and extractant are separated for further treatment and re-use, respectively.

Initial Screening: Chemical extraction (solvent extraction) has been field tested and is effective in treating sediments, soils, and sludges contaminated with PCBs. A physical separation process (e.g., screening) may be necessary prior to extraction depending on soil types encountered. Treated soil may be re-used on-site after a final water rinse. As this technology has been shown to be effective in treating PCBs, chemical extraction has been retained for further consideration.

Soil Washing

Soil washing is also a separation process whereby contaminants sorbed onto the fines portion of soil are separated in a water-based system from the containing medium. The water wash may be augmented with a leaching agent, surfactant, pH adjustment, or a chelating agent to help in removal. The process separates contaminants from soil in one of two ways: 1) by dissolving/suspending contaminants in the wash solution, or 2) by concentrating the contaminants into a smaller volume of soil through screening, gravity separation, and attrition scrubbing.

Initial Screening: Soil washing is also considered a media transfer technology. The contaminated water from the separation process requires additional treatment by the appropriate technology(s) for the contaminants of concern or disposal. The treated silt and clay fraction may potentially be disposed off-site without further treatment at a non-hazardous landfill or may be re-used in conjunction with a non-hazardous capping system. This technology is therefore retained for further evaluation.

Supercritical Fluid Extraction

In supercritical fluid extraction, a combination of temperature and pressure are used to promote solvents to or beyond their critical point, under which conditions they exhibit the properties of non-polar solvents. Typical systems operate at 70 °F to 100 °F and 200 psi to 1,000 psi, thereby allowing a more efficient extraction of organics than other processes, which utilize distillation or conventional solvent extraction methods. Carbon dioxide and propane are the typical gases used in this technology.

Initial Screening: Supercritical fluid extraction is applicable for removing VOCs and non-polar compounds including SVOCs and PCBs from soils. As this technology requires a pumpable sludge for treatment, a soil slurry must be prepared prior to treatment. This technology typically requires a higher capital cost and involves processes and equipment which are generally more complicated than other process options/technologies. It is therefore eliminated from further consideration.

In-Situ Treatment

The main advantage of in-situ treatment technologies is that they allow soil to be treated without being excavated and transported, resulting in potentially significant cost savings. However, in-situ treatment generally requires longer time periods, and there is less certainty about the uniformity of treatment because of variability in soil characteristics and the efficacy of the process is more difficult to verify. Due to the limited volume of material requiring treatment, the shallow extent of contamination, and since the contaminated soils are on private property, long-term complex treatment scenarios are not considered appropriate. Therefore, all in-situ treatment technologies have been eliminated from further consideration.

Vapor Phase Emission Control

The application and operation of certain treatment technologies may potentially involve vapor phase emissions. Air emission regulations may require that gaseous streams containing organic and inorganic contaminants undergo treatment or removal prior to discharge to the atmosphere. Potential treatment technologies include vapor phase carbon adsorption, incineration (afterburner), and catalytic oxidation.

Vapor Phase Carbon Adsorption

Adsorption treats vapor phase emissions by essentially transferring and concentrating volatile organics (the adsorbate) from one medium (vapor/gaseous stream) to another (adsorbent). The adsorbent is typically granular activated carbon (GAC). Multiple carbon bed vessels are typically needed to achieve adequate contact time.

<u>Initial Screening:</u> Vapor phase carbon adsorption is a well-established technology for treating vapor emissions. It is highly effective technology and provides a flexible method to comply with air regulations. This technology does not destroy contaminants, but decreases contaminant mobility and volume while increasing contaminant concentration in the adsorbent. Off-site disposal of GAC is required. This technology is retained for further evaluation.

Incineration (Afterburner)

The incineration or afterburner process is a thermally destructive method, which can be employed to destroy organic contaminants in the vapor phase.

<u>Initial Screening</u>: External energy sources are generally required for this technology. Incineration is a destructive technology while vapor phase GAC is not. Afterburner treatment may not be cost effective unless incineration is the chosen technology to treat contaminated soil on-site. Therefore, this technology is retained for further evaluation.

Catalytic Oxidation

Catalytic oxidation is a destructive technology in which vapor phase contaminants are oxidized in the presence of a catalyst.

Initial Screening: This technology may be employed as a final vapor phase treatment for organic vapors generated during different treatment process options. An external energy is generally required for this technology. This technology is retained for further evaluation.

2.4.3.5 Disposal

This category of remedial technologies refers to on-site and off-site disposal of contaminated soil or secondary wastes generated from treatment systems, with or without additional treatment. The disposal technologies included in the screening are construction of a new on-site Resource Conservation and Recovery Act (RCRA), Toxic Substances Control Act (TSCA) and/or non-hazardous landfill, and disposal at an existing off-site RCRA, TSCA, or non-hazardous landfill.

Disposal Technologies

Construction of an On-Site RCRA and/or TSCA Landfill

A new RCRA Subtitle C disposal facility could possibly be constructed within the site boundaries (i.e., the site itself, not the off-site properties). A typical RCRA landfill facility would consist of a double liner system, a leachate collection system, and a soil capping system including grass seeding. The collected leachate is either treated on-site or disposed at an off-site treatment facility.

Initial Screening: The area needed for an on-site RCRA landfill with the buffer zone considerations along property lines is a fairly large area. Based on the nature of the site and its planned redevelopment (to be further discussed in the OU-2 FS), construction of a RCRA landfill on-site is not considered feasible. Therefore, this disposal option is not retained for further consideration.

Existing Off-Site RCRA/TSCA Landfill

Contaminated soil and/or treated soil along with secondary wastes (e.g., wastes from other treatment options) generated from the off-site properties could be hauled to an existing RCRA Subtitle C landfill or TSCA landfill, depending on the PCB concentrations of the excavated soil.

Initial Screening: Land Disposal Restrictions (LDRs) prohibit disposing of RCRA listed or characteristic wastes that do not meet LDR standards. Soils that do not meet LDR standards must first be treated prior to disposal. The use of a RCRA Subtitle C landfill and/or TSCA landfill may also be required for disposal of excavated soil and secondary wastes from other treatment alternatives. This disposal option is therefore retained for further evaluation.

On-Site Non-Hazardous/Non-TSCA Disposal

This option allows for the redeposition or disposal of treated soil that does not exceed RCRA or TSCA limits.

Initial Screening: Treated soil and secondary wastes would be utilized to fill excavations and/or be disposed in an on-site non-hazardous disposal area if wastes meet LDR standards. Redeposition of treated soil would reduce the need for additional clean fill from an off-site source. Wastes from some treatment options may require institutional controls (land use restrictions) for re-use on-site. As the properties are privately-owned, on-site disposal is not considered feasible; therefore this option is not retained for further evaluation.

Off-Site Non-Hazardous/Non-TSCA Disposal

An existing licensed non-hazardous/non-TSCA landfill within New Jersey or neighboring states could be employed for the disposal of treated soils and secondary wastes (that were characterized as non-hazardous).

Initial Screening: This option would facilitate the off-site transportation and disposal of treated soil and other wastes which are classified as non-hazardous and not exceeding TSCA limits. This technology is therefore retained for further consideration.

2.4.4 Evaluation of Soil Remediation Technologies

In this section, feasible remedial technologies and process options that passed the initial screening (Section 2.4.3) are evaluated for effectiveness, implementability, and cost factors. The evaluation and selection of process options for soil treatment technologies are summarized on Table 2-3.

2.4.4.1 No Action

No Action would not involve any treatment and does not reduce the volume, toxicity or mobility of contaminants. It does not mitigate exposure pathways but can be easily implemented. No Action requires no capital cost and minimal operation and maintenance (O&M) cost. Although No Action does not meet remedial objectives, it is retained as the baseline alternative comparison as required by CERCLA.

2.4.4.2 Limited Action

Limited Action involves activities such as engineering controls (e.g., capping, fencing, etc.), institutional controls (e.g., land use restrictions), and public education. Limited action would not achieve RAOs since it would not restore properties to target cleanup levels; however, public exposure would be minimized. Implementation of engineering and institutional controls would be relatively easy, provided that government agencies are supportive of land use restrictions. However, on private properties, access restrictions such as fencing cannot practically be implemented, since property owners cannot be denied use of their own property. This option has both low capital and

O&M costs. Limited Action technologies, with the exception of fencing, have been retained for further evaluation as they have the potential to limit public exposure to contaminants.

2.4.4.3 Removal

- Excavation- Excavation employs construction and earth-moving equipment to physically remove contaminated soil for transportation, treatment, and/or disposal. It will not reduce the volume or toxicity of contaminated soil. Excavation can easily be implemented using common and available equipment but may require dust suppression and erosion and sediment controls. The capital cost associated with excavation is relatively low in comparison with other treatment technologies.

2.4.4.4 Thermal Treatment

- Incineration- Incineration is the most effective thermal treatment technology for destroying organic contaminants. It also greatly reduces the volume of organic contaminants and secondary wastes. It is easily implemented as both mobile and stationary incineration units are commercially available. Space constraints and soil pre-treatment requirements are a distinct disadvantage to on-site incineration. Off-gases from incineration must be treated prior to discharge to the atmosphere. The capital cost and O&M costs associated with incineration are highest among the available thermal treatment options. Another disadvantage to off-site incineration is that there are very few incinerators permitted to burn soils contaminated with PCBs.

- Thermal Desorption- Thermal desorption can effectively separate organics from soils and can treat the volatilized gas by carbon adsorption, an afterburner, or catalytic oxidation. Off-gases from the unit require treatment prior to discharge to the atmosphere. Thermal desorption can easily be implemented as there are readily available mobile and stationary units. The capital costs associated with thermal desorption implementation are generally considered moderate when compared to incineration.

- Pyrolysis- Pyrolysis can effectively remove PCBs from a contaminated media, but there is limited performance data on its successful field use. Off-gas from the unit requires treatment prior to discharge to the atmosphere, and pre-treatment of the soil may be necessary (e.g., drying of the soil to a moisture content of less than 1 percent and particle screening) . A treatability study would be necessary prior to the use of pyrolysis as a treatment technology. This technology has both moderate capital and O&M costs.

2.4.4.5 Physical/Chemical Treatment

- Dehalogenation- Dehalogenation effectively treats halogenated SVOCs and pesticides, and APEG is one of the few technologies successfully field tested in treating soils contaminated with PCBs. Treatment of the wastewater from this option is required prior to discharge. High clay and moisture contents will increase treatment costs. High contaminant concentrations require the use of additional reagents. This technology has been approved by the EPA's Office of Toxic Substances under TSCA for PCB treatment. Space constraints on the off-site properties are a distinct disadvantage for dehalogenation. There are no known commercial dehalogenation plants available for off-site treatment. This option has high capital costs.

- Chemical Extraction- Chemical (solvent) extraction has been shown to be effective in treating soils, sediments, and sludges contaminated with PCBs. Treatability studies are generally needed prior to the use as a remedial technology. Contaminated soils with greater than 15 percent clays or fines are difficult to treat as contaminants are strongly sorbed to the soil particles. Soils with a moisture content greater that 20 percent must be dried prior to treatment as excess water will dilute the extractant. Used solvent is recycled as part of the routine operation of the system, and the treated soils (not the silt and clay portion) may be redeposited in the operation area, typically without additional treatment, although the addition of an organic and inorganic nutrient supplement may be necessary. This option has moderate capital costs, although space constraints play a major role in capital costs (typically a small-scale unit requires 400 square feet of space).

- Soil Washing- Soil washing has been shown to be effective in treating a wide variety of contaminants, including PCBs. Soils with a high humic content may need to be pretreated. Soil washing reduces the volume of contaminated soil. The wastewater generated could be treated by conventional wastewater treatment systems for recycling. This technology has had limited use at EPA Superfund sites. In general, this option has both moderate capital and O&M costs.

2.4.4.6 Vapor Phase Emission Control

- Vapor Phase Carbon Adsorption - Carbon adsorption is the traditional method for effectively removing organic contaminants from the vapor phase. This emission control technology can be easily implemented, and there are numerous vendors who provide both fresh and reactivated carbon. The spent carbon requires either off-site disposal, or on or off-site regeneration. The capital cost for this technology is among the lowest of all emission control technologies.

- Incineration (Afterburner) - Incineration can effectively destroy all organic contaminants in an off-gas and also achieve reductions in toxicity, mobility, and volume of organic contaminants. This well-developed and demonstrated technology can easily be implemented due to its commercial availability. Most afterburners require an external energy source for certain types of organic contaminants. The capital cost for this option is higher than that associated with carbon adsorption.

- Catalytic Oxidation - This is a newly developed and innovative technology to effectively oxidize and convert organic contaminants into non-toxic compounds in an off-gas stream. This technology also reduces the toxicity and volume of organic contaminants in the vapor stream. Due to its relatively small space constraints, and easy installation and operation, catalytic oxidation is quickly becoming the preferred method for vapor emission control. The capital cost associated with catalytic oxidation is typically less than that of an afterburner but greater than that associated with carbon adsorption.

2.4.4.7 Disposal

- Existing Off-Site RCRA/TSCA Landfill - This option removes contaminated soil or treated soil from the off-site properties, thereby limiting direct contact with contamination by the public.

There are RCRA and TSCA landfills which would be capable of accepting the excavated soil. Only capital costs are associated with this technology. There are no O&M costs as the contaminated/treated media are permanently removed.

- Off-Site Non-Hazardous/Non-TSCA Landfill - This option removes permanently from the properties any treated soil which can be classified as non-hazardous/non-TSCA waste to a municipal sanitary landfill or commercial non-hazardous landfill facility. There are numerous municipal landfill and commercial non-hazardous landfill facilities in the area of the Cornell-Dubilier Electronics site, which makes implementation of this alternative an option at a relatively low capital cost. There are no O&M costs associated with this option as non-hazardous non-TSCA wastes are transported off-site.

SECTION 2

TABLES

TABLE 2-1
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
GENERAL RESPONSE ACTIONS, TECHNOLOGY TYPES, AND PROCESS OPTIONS FOR SOIL

General Response Actions	Remedial Technology Types	Process Options
No Action	**No Action**	
-No Action	No Action	Five-year reviews
Limited Action	**Limited Action**	
-Limited Action	Institutional Controls	Inform local officials, hold public meetings, access and land-use restrictions
	Engineering Controls	Placement of geotextile liner and sod to cap areas of contaminated soils
		Install fencing to restrict access to properties with contaminated soils
Excavation/Treatment Actions:	**Excavation Technologies**	
-Excavation/Treatment/Disposal	Removal of soil	Excavation
	Treatment Technologies	
	Thermal	Incineration, thermal desorption, pyrolysis
	Physical/Chemical	Dehalogenation, Chemical Extraction, soil washing, super-critical fluid extraction
	In-situ Treatment	Soil vapor extraction, soil flushing, steam stripping, biodegradation, chemical oxidation/reduction, solidification/stabilization
	Vapor Phase Emission Control	Vapor phase carbon adsorption, incineration (afterburner), catalytic oxidation
	Disposal	Construction of an on-site RCRA/TSCA landfill, existing off-site RCRA/TSCA landfill, on-site non-hazardous disposal, off-site non-hazardous disposal

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TABLE 2-[illegible] (Sheet 1 of 4)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
INITIAL SCREENING OF SOIL REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS

General Response Actions	Remedial Technology Categories and Process Options	Description	Technically Feasible	Screening Comments
1) No Action	**No Action**	No action taken.	X	Provides baseline against which other remedial technologies can be compared. Required for consideration by CERCLA as amended.
2) Limited Action	**Limited Action**			
	- Engineering Controls	Construct cap on properties using polyethlylene liners and sod in areas of contaminated soils.	X	Feasible, but used mainly on industrial properties and would be difficult to maintain on residential property.
	- Institutional controls/land use restriction	Generate Deed Notices for each residence.	X	Feasible, but difficult to implement on private property.
		Install fencing surrounding properties to restrict access		Feasible to construct fence, but would not achieve the objective of preventing access to contaminated soils on private property.
	- Inform local officials hold public meetings	Public awareness programs instituted.	X	Reduce likelihood of public exposure to contaminants.
3) Removal	**Excavation**			
	-Removal of soil	Excavation involves removing contaminated soil using backhoes, bulldozers, front-end loaders and draglines.	X	Required component of many potential process options.
4) Treatment	**Thermal Treatment**			
	-Incineration	Thermal destructive method for all forms of organic contamination involving high temperature range from 1,200° to 2,400°F.	X	Feasible for organics of concern (i.e., PCBs).
	-Thermal Desorption	Thermal stripping process which promotes the volatilization of volatile and semi-volatile organics and water from soil to air. Temperatures range from 400°F to 900°F.	X	Feasible for organics of concern (i.e., PCBs).

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TABLE 2-2 (Sheet 2 of 4)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
INITIAL SCREENING OF SOIL REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS

General Response Actions	Remedial Technology Categories and Process Options	Description	Technically Feasible	Screening Comments
	-Pyrolysis	Chemical decomposition is induced in organic materials by heat in the absence of oxygen. Organic materials are transformed into gaseous components and a solid residue (coke) containing fixed carbon and ash.	X	Feasible for organics of concern (i.e., PCBs).
	Physical/Chemical Treatment			
	-Dehalogenation	Reagents are added to soils contaminated with halogenated organics and heated in a reactor. Dehalogenation is achieved either by the replacement of the halogen molecule or the decomposition and partial volatilization of the contaminants.	X	Developed and demonstrated for the dehalogenation of PCBs.
	-Chemical Extraction	Waste-contaminated soils and extractants are mixed in an extractor to dissolve the contaminants. Extracted solutions are then placed in a separator where the contaminants and extractants are separated for treatment and further use.	X	Feasible and demonstrated as effective in treating soils, sediments, and sludges contaminated with the organics of concern (i.e., PCBs).
	-Soil Washing	Water-based process for scrubbing soils to remove contaminants either by dissolving/suspending them in the wash solution or concentrating them into a smaller volume of soil through particle size separation, gravity separation, and attrition scrubbing.	X	Feasible for organics of concern (i.e., PCBs).
	-Supercritical Fluid Extraction	Use of certain gases (CO_2 or propane) that have excellent dissolving characteristics when heated and compressed to or near their critical point to remove contaminants from soil. Typical systems operate at 70°F to 100°F and 200 psi to 1,000 psi.		Not feasible due to high capital cost and limited availability of technology.

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TABLE 2-2 (Sheet 3 of 4)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
INITIAL SCREENING OF SOIL REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS

General Response Actions	Remedial Technology Categories and Process Options	Description	Technically Feasible	Screening Comments
	In-Situ Treatment			
	- Soil Vapor Extraction	Vacuum is applied to subsurface to extract volatile organic compounds		Not effective for PCB removal.
	-Soil Washing	Aqueous solution is injected into contaminated soil and extracted with removed constituents.		Not effective for PCB removal.
	-Steam Stripping	Steam is injected at periphery of contaminated zone and extracted at center of impacted area with removed constituents.		Not feasible for shallow soil remediation.
	-Biodegradation	Addition of nutrients, oxygen and sometimes microorganisms to stimulate biological degradation of contaminants.		May be feasible for PCBs, but requires long-term management and may not achieve cleanup. levels.
	-Chemical Reduction/Oxidation	Injection of chemical reagants to oxidize contaminants of concern.		May be feasible, but not practical for small, shallow areas impacted with PCBs.
	-Stabilization/Solidification	Chemical/physical process whereby contaminated soils are converted into a stable cement-like matrix in which contaminants are bound and become immobile.		Not feasible as the off-site properties are private residences/businesses whose owners may not be amendable to leaving the treated media on-site having a solidified mass incorporated into their properties.
	Vapor Phase Emission Control			
	-Vapor Phase Carbon Adsorption	Contaminants present in the vapor phase are adsorbed to activated carbon granules for final destruction or disposal of contaminants.	X	Feasible for treating vapor phase contaminants resulting from other soil treatment processes.
	-Incineration (Afterburner)	Thermally destructive process for contaminants present in the gaseous vapor phase.	X	Feasible for treating vapor phase contaminants resulting from other soil treatment processes.

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
INITIAL SCREENING OF SOIL REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS

General Response Actions	Remedial Technology Categories and Process Options	Description	Technically Feasible	Screening Comments
	-Catalytic Oxidation	Vapors are oxidized in the presence of a catalyst and heat.	X	Feasible for treating vapor phase contaminants resulting from other soil treatment process options. May need input from an external energy source.
	Disposal Technologies			
5) Disposal	-Construction of an on-site RCRA and/or TSCA landfill	New RCRA and TSCA facilities constructed within the site boundary for disposal of contaminated soils.		Not feasible as these are private properties.
	-Existing off-site RCRA/TSCA landfills	Contaminated soil and secondary waste is hauled to an existing RCRA/TSCA landfill which is already permitted to accept PCB-contaminated materials.	X	Feasible for disposal of soils and/or secondary wastes from soil treatment process options for soils that meet RCRA and TSCA facility criteria.
	-On-site non-hazardous/non-TSCA landfill	The treated soil would be redeposited on-site.		Not feasible as these are private properties.
	-Off-site non-hazardous/non-TSCA disposal	The treated soil and other wastes which are classified as non-hazardous are transported to an existing landfill permitted to accept non-hazardous wastes.	X	Potentially feasible if soil meets non-hazardous criteria.

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TABLE 2-3 (Sheet 1 of 3)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
EVALUATION OF PROCESS OPTIONS FOR SOIL

General Response Actions	Remedial Technology Categories and Process Options	Effectiveness	Implementability	Cost
1) No Action	**No Action** * Monitor contaminant migration and conduct 5-year reviews of data	Useful for documenting conditions. Reduction in volume and toxicity of contaminated soil is left to natural attenuation, and exposure routes are not addressed.	Easily implemented.	No capital and no operation and maintenance (O&M) costs.
2) Limited Action	**Limited Action** * Engineering controls, hold public meetings, employ land use restrictions.	Useful for documenting conditions. Reduction in volume and toxicity of contaminated soil is left to natural attenuation and direct contact to contaminants is reduced.	Easily implemented.	Low capital, low O&M costs.
3) Removal	**Excavation** *			
	Removal of soil	Effective at removing contaminated soil. Does not reduce volume or toxicity of contaminated soil which will require subsequent treatment/ disposal.	Easily implemented. Can be completed using common construction equipment. Erosion and sediment control required.	Low capital, no O&M costs.
4) Treatment	**Thermal Treatment**			
	Incineration	Highly effective for destroying organic contaminants. Off-gas needs air pollution control and pretreatment of soil may be necessary.	Easily implemented although there are a limited number of incinerators which can burn PCBs. Mobile and stationary facilities are available and space constraints need consideration for on-site application.	High capital, no O&M costs.
	Thermal Desorption	Effectively removes contaminants from soil at high temperatures. Off-gas needs air pollution control and pre-treatment of soil may be necessary.	Easily implemented. Mobile treatment units are available for on-site application.	Moderate capital, no O&M costs.

* Technology and process option retained for alternative development.

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TABLE 2-3 (Sheet 2 of 3)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
EVALUATION OF PROCESS OPTIONS FOR SOIL

General Actions	Remedial Technology Categories and Process Options	Effectiveness	Implementability	Cost
	Pyrolysis	Effectively removes PCBs from soil although there is limited performance data on treating wastes containing PCBs. Off-gas needs air pollution control and pretreatment of soil may be necessary.	Easily implemented.	Moderate capital, no O&M costs.
	Physical/Chemical Treatment			
	Dehalogenation	Effectively treats halogenated SVOCs and pesticides. Glycolate/Alkaline Polyethylene Glycol (APEG) dehalogenation is one of the few processes successfully field tested in treating PCBs besides incineration.	Easily implemented although high contaminant concentrations require large volumes of reagent.	High capital, no O&M costs.
	Chemical Extraction	Effective in treating sediments, soil and sludges containing primarily organic contaminants (e.g., PCBs, VOCs, etc.)	Developmental technology. Many vendors are available. Treated silt and clay portion cannot be redeposited on-site or use of the site must be restricted.	Moderate capital, no O&M costs.
	Soil Washing	Effective in treating a wide range of contaminants including heavy metals and SVOCs.	Duration is typically short to medium-term. Complex wastes make formulating washing fluid difficult and aqueous stream requires treatment after demobilization.	Moderate capital, no O&M costs.
	Vapor Phase Emission Control			
	Vapor Phase Carbon Adsorption	Effective in removing vapor phase organic contaminants.	Easily implemented. Regeneration or off-site disposal of spent carbon.	Moderate capital, no O&M costs.

* Technology and process option retained for alternative development.

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TABLE 2-3 (Sheet 3 of 3)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
EVALUATION OF PROCESS OPTIONS FOR SOIL

General Response Actions	Remedial Technology Categories and Process Options	Effectiveness	Implementability	Cost
	Incineration (Afterburner)	Destroys organic contaminants.	Easily implemented. May need external energy source.	High capital, no O&M costs.
	Catalytic Oxidation	Destroys organic contaminants.	Easily implemented.	High capital, no O&M costs.
5) Disposal	**Disposal Technologies**			
	Existing off-site RCRA/TSCA landfill *	Removes contaminated media from properties. Reliable method to contain wastes. Reduces direct contact by public.	Easily implemented.	High capital, no O&M costs.
	Off-site non-hazardous/non-TSCA landfill*	Effective for disposal of non-hazardous/ non-TSCA wastes and treated soil.	Easily implemented but only applicable if soils are non-hazardous/non-TSCA waste.	Low capital, no O&M costs.

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* Technology and process option retained for alternative development.

SECTION 3.0

3.0 DEVELOPMENT AND INITIAL SCREENING OF REMEDIAL ALTERNATIVES

In this section, the technically feasible remedial technologies and process options identified in Section 2.0 are grouped into potential remedial alternatives for the contaminated soil. The next stage in the feasibility evaluation typically consists of a preliminary screening of potential remedial alternatives based on the general criteria of effectiveness, implementability, and cost. The purpose of the screening step is to reduce the number of alternatives requiring detailed evaluation by identifying those alternatives having sufficient merit to undergo a detailed evaluation. This is achieved by eliminating remedial alternatives that have significant adverse environmental or public health impacts or cannot be successfully implemented. Costs may be used to discriminate between treatment alternatives in the screening process, but not between treatment and non-treatment alternatives. As a result of the small number of feasible alternatives developed for the off-site properties, preliminary screening was not performed; all of the alternatives identified in this section were carried forward for detailed evaluation in Section 4.0.

3.1 Development of Remedial Alternatives

RAOs were established for the protection of public health and the environment as discussed in Section 2.2 of this report. In order to achieve the established RAOs, response criteria are first developed to evaluate the acceptability of environmental and public health impacts and the anticipated performance of the alternatives. This step establishes ARARs and other criteria as appropriate to define performance requirements and potential human health risks associated with the remedial alternatives. Next, potentially applicable technologies identified in Section 2.4 are used to develop comprehensive media-specific remedial alternatives on the basis of operation and performance compatibility, and the use of acceptable engineering practices. Each step of the process is described in the following sections.

3.1.1 Development of Remedial Response Criteria

This subsection describes the use of ARARs in FS evaluations and identifies the ARARs used to evaluate the remedial alternatives.

3.1.1.1 Use of ARARs and TBCs in Remedial Alternative Evaluation

EPA developed the ARAR concept under CERCLA/SARA to govern compliance with environmental and public health statutes. ARARs are used in the FS process to characterize the performance level that a remedial alternative or a treatment process is capable of achieving. Each remedial alternative and treatment process option must be assessed to evaluate whether it attains or exceeds federal and state ARARs.

Two types of ARARs exist: "applicable" and "relevant and appropriate" requirements of federal and state environmental laws. An applicable requirement is any federal or state environmental standard, limitation, or other requirement that would be legally binding (based on the contaminants present, the nature of the response action, and the location of the site) if the response action were not being carried out under the authority of CERCLA. A "relevant and appropriate" requirement is any federal or state standard or limitation that, while not applicable to the hazardous substance, action, or location at a CERCLA site, does address problems or situations sufficiently similar to those encountered at the CERCLA site for which its use is suited. When establishing performance goals for remedial alternative selection, relevant and appropriate requirements are given weight and consideration equal to applicable requirements. State requirements are ARARs when promulgated, identified in a timely manner, and at least as strict as existing equivalent federal ARARs. Section 121 of CERCLA requires that EPA select actions that will comply with ARARs, unless the criteria for a waiver are met (as discussed later in this section) and EPA waives one or more ARARs. In general, permits are not required for CERCLA site activities; however, all substantive requirements of the otherwise required permits must be met.

If no ARARs address a particular situation, or if existing ARARs do not ensure protection of human health and the environment at a particular site, other federal and state criteria, advisories, guidance, or proposed rules may be considered for developing remedial alternative performance goals. These TBCs may provide useful information or recommended procedures that supplement, explain, or amplify the content of ARARs.

Each type of ARAR can be characterized further as chemical-specific, action-specific, or location-specific. A chemical-specific ARAR sets health and risk-based concentration limits in various environmental media for specific hazardous substances or contaminants. An action-specific ARAR sets performance, design, or other similar action-specific controls on particular remedial activities. A location-specific ARAR sets restrictions for conducting activities in particular locations, such as wetlands, floodplains, national historic districts, and others.

3.1.1.2 Identification of ARARs and TBCs for the Site

Federal and New Jersey ARARs and TBCs considered in this FS are presented in Tables 3-1, 3-2, and 3-3.

3.1.1.3 General Discussions of Key ARARs and TBCs

This subsection presents general discussions of those contaminant-specific ARARs and TBCs which provide the key requirements in remedial alternative evaluation and comparison. The focus of these discussions is on distinguishing between alternatives based upon ARARs/TBCs attainment, rather than an exhaustive description of the ARARs/TBCs alternatives.

- Cleanup Criteria for Contaminated Sites (NJAC 7:26D) provides a TBC contaminant cleanup level for PCBs of 0.49 mg/kg in residential soil.

- EPA Soil Screening Level for Direct Ingestion provides a cleanup level for PCBs of 1.0 mg/kg in residential soil.

- RCRA Hazardous Waste Disposal 40 CFR 268.48 states that hazardous waste soils containing less than 1,000 mg/kg of PCBs can be land disposed in a RCRA Subtitle C landfill without treatment for PCBs. Soils containing greater than 1,000 mg/kg PCBs will require treatment prior to landfill.

- TSCA PCB Disposal Requirements regulates general PCB disposal requirements for all actions and provides jurisdiction for EPA cleanup. Soils and debris with PCB concentrations greater than or equal to 50 mg/kg must be disposed in either a TSCA incinerator or in a TSCA landfill, or when the first two options are not reasonable, by a disposal method that will protect human health and the environment. These soils may also be developed in a RCRA Subtitle C landfill that is permitted to accept TSCA wastes.

3.1.2 Combination of Potential-Applicable Technologies into Feasible Alternatives

Based upon the nature and extent of contamination (Section 1.2.3) and the baseline human health risk assessment (Section 1.2.5), the soil present on specific OU-1 properties (i.e., Properties 1, 13, and 18) requires remedial action. Remedial objectives that address these risks are identified in Section 2.0. Soil remedial alternatives are formulated so as to achieve these objectives.

Contaminated Soil Remedial Alternatives

The contaminated soil remedial alternatives in this FS were developed based on the following considerations:

- The OU-1 soils contain levels of PCBs above the PRG. Properties 1, 13, and 18 have been identified as areas of contamination.

- The estimated volume of soil to be remediated to address the areas of contamination on Properties 1, 13, and 18 to meet the PRG of 1.0 mg/kg is approximately 620 cy (see Appendix C).

- Additional areas of contamination may be present in the study area. Should pre-design sampling indicate additional areas of contamination exceeding the PRG, the alternatives should be capable of addressing these additional areas.

- The areas of contamination for OU-1 (Properties 1, 13, and 18, as well as additional areas of contamination that may be identified based on pre-design investigations) are located on private and municipal properties; coordination with multiple property owners would be required to implement any remedial activities on these properties.

Based on the soil remedial technology screening (Section 2.0) and the above considerations, the potential soil remedial alternatives are summarized as follows:

- Alternative 1: No Action
- Alternative 2: Limited Action
- Alternative 3: Excavation/Treatment (if necessary)/Off-Site Disposal

3.2 Description and Screening of Remedial Alternatives

The purpose of this section is to describe and screen the remedial action alternatives developed in Section 3.1.2 to reduce the number of alternatives for detailed analysis while preserving a range of technical options. Based on the limited number of alternatives developed, the initial screening of alternatives to reduce the number of alternatives for detailed analysis was not performed. The following sections present only a description of the soil remedial alternatives that were subject to detailed analysis.

3.2.1 Alternative 1: No Action

The No Action alternative provides the baseline case for comparison with other soil remedial alternatives. Three properties sampled during the OU-1 RI have been identified as areas of contamination, and the pre-design investigation may identify additional areas of contamination. In this alternative, contaminated soils would be left in place, without any type of treatment or monitoring. As required by CERCLA, regular five-year reviews would be performed to assess the need for additional remedial actions in the future.

3.2.2 Alternative 2: Limited Action

In this alternative, as in the No Action alternative, the contaminated soils are left in place without any type of treatment. This alternative includes the construction of a cap using geotextile liner and sod ground cover. The cap would be constructed in areas of contamination identified in this FS (i.e., Properties 1, 13, and 18) as well as additional areas of contamination that may be identified during pre-design investigations. This cap would act as a barrier between the contaminated soil and residents, and would therefore reduce the risks associated with exposure to contaminated soils. This alternative would also include interior cleaning of homes, as necessary, based on pre-design interior dust sampling.

This alternative also includes the implementation of public education programs and land use restrictions. These measures would educate the public about the potential hazards posed by exposure to contaminants in the soil and ensure that any future activities on the properties containing the contaminated soil would be performed with the knowledge of the potential risks and require the implementation of the appropriate health and safety controls.

3.2.3 Alternative 3: Excavation/Treatment (if necessary)/Off-Site Disposal

In this alternative, the contaminated soils would be excavated from the areas of contamination (i.e, Properties 1, 13, and 18, as well as any additional areas of contamination identified during pre-design investigations) to achieve the PRG of 1 ppm. The excavated soil would be disposed at either a non-hazardous, RCRA, or TSCA landfill, depending upon the concentration of PCBs present in the soil. Soils with PCB concentrations of less than 50 mg/kg may be acceptable for disposal at a non-hazardous landfill. Soils with PCB concentrations equal to or greater than 50 mg/kg would likely need to be transported to a TSCA landfill or RCRA Subtitle C landfill permitted to accept TSCA wastes. The volume of soil has been estimated to be approximately 2,100 cy and is not expected to require treatment before disposal. This alternative would also include interior cleaning of homes, as necessary, based on pre-design interior dust sampling.

Once excavation activities have been completed, the properties would be restored by backfilling the excavated areas with clean fill to within six inches of original grade and then topsoil to original grade. The backfilled areas would be revegetated with sod to stabilize the soils and the properties would be returned to their original condition (i.e., any disturbed fencing, landscaping, etc. would be replaced). Long-term monitoring requirements would not be necessary for these properties if this alternative was implemented.

SECTION 3

TABLES

TABLE 3-1

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
CHEMICAL–SPECIFIC ARARs, CRITERIA AND GUIDANCE

Authority	Citation	Type/ Status	Requirement Synopsis	Actions to be Taken to Attain ARARs
Federal				
TSCA – PCB Remediation Waste	40 CFR 761.61(a) 4	Applicable	Establishes cleanup standards for PCB Bulk Remediation Wastes including soils and debris	Sites will be cleaned up to meet "high occupancy" standard of 1.0 mg/kg PCBs in soils.
New Jersey				
Criteria for Contaminated Sites	N/A	To Be considered	Establishes Residential Direct Contact, Non-residential Direct Contact and Impact to Groundwater Soil Cleanup Criteria	Establishes a residential direct contact cleanup criterion of 0.49 mg/kg; and 2.0 mg/kg for non-residential direct contact.

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TABLE 3-2 (Sheet 1 of 5)

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ACTION–SPECIFIC ARARs, CRITERIA AND GUIDANCE

Authority	Citation	Type/ Status	Requirement Synopsis	Actions to be Taken to Attain ARARs
Federal				
TSCA Institutional Controls	40 CFR 761.61(a)(4)(i)(A) (a)7 and (a)8	Applicable	Soils not meeting the TSCA cleanup standard for PCBs of 1 mg/kg must be capped. Cap specifications in 40 CFR 761.61(a)(7) and (a)(8).	Soils on Properties 1, 13, and 18 do not meet TSCA cleanup criteria and if not excavated, would have to be capped.
TSCA PCB Disposal Requirements	15 USC 2601-2692; 40 CFR 761.50(a)(3) and (b)(3)(i)(A): 40 CFR 761.60(a)(5)	Applicable	Provides general PCB disposal requirements for all actions and jurisdiction for EPA cleanup. Soils and debris with PCB concentrations greater than or equal to 50 mg/kg must be disposed in either a TSCA incinerator or in a TSCA landfill, or, when the first two options are not reasonable, by a disposal method which will protect health and the environment.	Excavated TSCA soils will be disposed in a TSCA permitted landfill.
TSCA PCB Storage Requirements	40 CFR 761.65(a)	Applicable	PCBs stored for disposal must be properly disposed within 30 days of being excavated/generated. A one-year extension is granted upon notification to the Regional Administrator.	Soils are expected to be shipped off-site immediately after excavation. If required, on-site storage of stockpiled soils will be for less than 30 days. If the remedy requires on-site storage for more than 30 days, an extension notification will be submitted.

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TABLE 3-2 (Sheet 2 of 5)

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ACTION –SPECIFIC ARARs, CRITERIA AND GUIDANCE

Authority	Citation	Type/ Status	Requirement Synopsis	Actions to be Taken to Attain ARARs
Federal				
TSCA PCB Storage Requirements (Cont'd)	40CFR 761.65(b)(9)	Applicable	Defines storage requirements for PCB waste containers.	Container storage areas shall be constructed with impervious liners, curbing, roof and walls. PCB wastes will be placed in US DOT specification containers. Containers will be inspected weekly.
Clean Water Act (CWA), National Pollutant Discharge Elimination System (NPDES) Stormwater Discharges	33 USC 1342; 40 CFR 122	Applicable	Governs discharge of stormwater from construction sites more than one acre in size. While CERCLA sites are not required to obtain NPDES stormwater discharge permits, substantive require-ments, including development and implementation of a Storm-water Pollution Prevention Plan are required.	Project will develop and implement a Stormwater Pollution Prevention/Soil Erosion and Control Plan for construction activities.

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TABLE 3-2 (Sheet 3 of 5)

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ACTION–SPECIFIC ARARs, CRITERIA AND GUIDANCE

Authority	Citation	Type/ Status	Requirement Synopsis	Actions to be Taken to Attain ARARs
Federal				
TSCA Decontamination	40 CFR 761.79 761.61(a)(I)	Applicable	Sets decontamination standards for removal of PCBs from water, organic liquids, concrete, and porous and non-porous surfaces.	Equipment and personal protective gear will be decontaminated in accordance with these substantive requirements.
TSCA PCB Spill Cleanup Policy	40 CFR 761.120-135	Relevant and Appropriate	Establishes criteria to determine adequacy of the cleanup of spills (occurring after 4 May 1987) from the release of materials with PCB concentrations greater than 50 mg/kg.	This policy will be considered to address any spills or releases of PCBs that occur during waste handling.
Guidance on Remedial Actions for Superfund sites with PCB Contamination	N/A	To Be Considered	Describes the recommended approach for evaluating and remediating CERCLA sites with PCB contamination.	This guidance will be considered when evaluating PCB issues associated with excavating, stockpiling and off-site disposal of PCB soils.

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TABLE 3-2 (Sheet 4 of 5)

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ACTION–SPECIFIC ARARs, CRITERIA AND GUIDANCE

Authority	Citation	Type/ Status	Requirement Synopsis	Actions to be Taken to Attain ARARs
Federal				
US DOT Hazardous Materials Transportation Regulations	49 CFR 172.101	Applicable	Hazardous Materials Table provides information on regulated hazardous materials, including hazard classes, packing and labeling standards.	Specifies packaging, labeling, marking, and placarding requirements for off-site shipment of hazardous and TSCA wastes.
	49 CFR 172.700-704	Applicable	Requirements for USDOT training.	Specifies biannual training requirements for on-site workers engaged in a USDOT function.
	49 CFR 173	Applicable	Packaging requirements for USDOT regulated hazardous materials and hazardous wastes.	Specifies requirements for packaging of bulk, non-bulk hazardous, and TSCA wastes to be shipped off-site.

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TABLE 3-2 (Sheet 5 of 5)

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ACTION–SPECIFIC ARARs, CRITERIA AND GUIDANCE

Authority	Citation	Type/ Status	Requirement Synopsis	Actions to be Taken to Attain ARARs
New Jersey				
Hazardous Waste Management –Transportation	N.J.A.C. 7:26G – 7	Applicable	Establishes standards applicable to transporters of hazardous wastes.	All hazardous waste shipped off-site will be transporter by a NJDEP Licensed Transporter in accordance with these regulations.
Standards for Soil Erosion and Sediment Control in New Jersey	N.J.A.C. 2:90-1.1	Guidance	Describes the recommended approach and standards to be used for preparation and implementation of Soil Erosion and Sediment Control Plans.	This guidance document will be considered when preparing the Soil Erosion and Sediment Control Plan for construction activities.

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TABLE 3-3

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
LOCATION–SPECIFIC ARARs, CRITERIA AND GUIDANCE

Authority	Citation	Type/ Status	Requirement Synopsis	Actions to be Taken to Attain ARARs
Federal				
TSCA PCB Storage Requirements	40 CFR 761.65(b)(1)(v)	Applicable	Storage facilities must not be located below the 100-year floodwater elevation.	PCB soil stockpiles will be located above the 100-year flood elevation.
Protection of Wetlands	Executive Order 11990	TBC	Requires consideration of impacts to wetlands in order to minimize their destruction, loss or degradation and to preserve/enhance wetland values.	Potential TBC for sampling work and any site removal or backfilling work within wetlands and wetland buffer zones.
Floodplain Management - Executive Order 11988	40 CFR Part 6, Appendix A	TBC	Federal agencies are required to reduce the risk of flood loss, minimize impact of floods, and restore and preserve the natural and beneficial values of floodplains.	Potential TBC if site activities will occur in a floodplain.
New Jersey				
Fresh Water Wetlands Protection Act	N.J.A.C. 7:7A –6 & 7	Applicable	Provides requirements for protection of wetlands.	Best available measures will be used to minimize adverse effects on wetland transition areas during design and implementation of remedy.
Stream Encroachment	N.J.A.C. 7:13-4	Applicable	Provides requirements for protection of floodplains.	Best available measures will be used to minimize adverse effects on floodplain areas during design and implementation of remedy.

SECTION 4.0

4.0 DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES

This section presents a detailed description and evaluation of the three remedial alternatives identified in Section 3.0. The remedial alternatives are examined with respect to the requirements stipulated in the RI/FS Guidance document (EPA, 1988a) and *Technology Screening Guide for Treatment of CERCLA Soils and Sludges* (EPA, 1988c). Section 4.1 discusses the evaluation processes used and the nine criteria against which the remedial actions are analyzed. Section 4.2 describes the alternatives in detail and evaluates each with respect to the evaluation criteria. Section 4.3 presents a comparison of the remedial alternatives.

4.1 Evaluation Process

A detailed analysis of the remedial alternatives consists of the following components and processes:

- Further definitions of each alternative, if appropriate, with respect to the volumes and areas of contaminated media to be addressed, the technologies to be used, and any performance requirements associated with those technologies.

- Assessment and summary of each alternative against the nine evaluation criteria as defined by the RI/FS Guidance document (EPA, 1988a).

- Comparative analysis among the remedial alternatives to assess the relative performance of each alternative with respect to each evaluation criterion.

Based on the statutory preferences and the remedial response objectives developed in Section 3.0, remedial alternatives shall meet the following requirements during evaluation and selection:

- Protection of human health and the environment (CERCLA Section 121 (b)).

- Attainment of the ARARs of federal and state laws (CERCLA Section 121(d)(2)(A)) or warranting a waiver under CERCLA Section 121(d)(4)).

- Reflection of a cost-effective solution, taking into consideration short- and long-term costs (CERCLA Section 121(a)).

- Use of permanent solutions and treatment technologies or resource recovery technologies to the maximum extent practicable (CERCLA 121(b)).

- Satisfaction of the preference for remedies that employ treatments that permanently and significantly reduce the toxicity, mobility, or volume of hazardous substances as a principal element or explanation of reasons why such remedies were not selected (CERCLA Section 121(b)).

In order to address the CERCLA requirements adequately, nine evaluation criteria were developed (EPA, 1988a).

The first two criteria are the "threshold" factors. Any alternative that does not satisfy both of these criteria is dropped from further consideration in the detailed analysis. These are:

1) Overall protection of human health and the environment.
2) Compliance with ARARs.

Five "primary balancing" criteria are used to make comparisons and to identify the major trade-offs between the remedial alternatives. Alternatives that satisfy the threshold criteria are evaluated further using the following balancing criteria:

1) Long-term effectiveness.
2) Reduction of toxicity, mobility, or volume.
3) Short-term effectiveness.
4) Implementability.
5) Cost.

The remaining two criteria, state acceptance and community acceptance, are "modifying" factors. State acceptance will be evaluated in the Proposed Plan after receiving state comments on this Feasibility Study Report. The Proposed Plan will identify the remedial alternatives preferred by EPA and NJDEP. The final evaluation criterion, community acceptance, will be evaluated in the ROD after the public comment period is completed.

A discussion of the nine evaluation criteria is presented below.

4.1.1 Overall Protection of Human Health and the Environment

This evaluation criterion provides an overall assessment of protection based on a composite of long-term and short-term effectiveness factors. Evaluation of overall protection addresses:

- How well a specific site remedial action achieves protection over time;
- How well site risks are reduced; and
- How each source of contamination is to be eliminated, reduced, or controlled for each remedial alternative.

4.1.2 Compliance with ARARs

This evaluation criterion is used to determine how each remedial alternative complies with federal and state ARAR requirements as defined in CERCLA Section 121. Each alternative is evaluated in detail for:

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- Compliance with chemical-specific ARARs (e.g., RCRA and TSCA Standards);
- Compliance with action–specific ARARs (e.g., RCRA minimum technology standards);
- Compliance with location-specific ARARs (e.g., preservation of historic sites); and
- Compliance with appropriate criteria, advisories, and guidances (i.e., TBC material).

Section 3.1.1.2 presents an overall list of ARARs and TBC material that were used to evaluate the remedial alternatives. Specific statutory or regulatory citations and their applications to the remedial alternative evaluations are contained in Sections 4.2 and 4.3.

4.1.3 Long-Term Effectiveness

This evaluation criterion addresses the results of the remedial action in terms of the risk remaining after the response objectives have been met. The components of this criterion include the magnitude of the remaining risks measured by numerical standards such as cancer risk levels; the adequacy and suitability of controls used to manage treatment residuals or untreated wastes; and the long-term reliability of management controls for providing continued protection from residuals (i.e., the assessment of potential failure of the technical components).

4.1.4 Reduction of Toxicity, Mobility, or Volume

This evaluation criterion addresses the statutory preference that treatment results in the reduction of the total mass of toxic contaminants, the irreversible reduction in contaminant mobility, or the reduction of the total volume of contaminated media. Factors to be evaluated in this criterion include the treatment process employed; the amount of hazardous material destroyed or treated; the degree of reduction in toxicity, mobility, or volume expected; and the type and quantity of treatment residuals.

4.1.5 Short-Term Effectiveness

This evaluation criterion addresses the impacts of the remedial action during the construction and implementation phases preceding the attainment of the remedial response objectives. Factors to be evaluated include protection of workers and neighboring communities during the remedial actions, environmental impacts resulting from the implementation of the remedial actions, and the time required to achieve protection.

4.1.6 Implementability

This criterion addresses the technical and administrative feasibility of implementing a remedial action and the availability of various services and materials required during its implementation. Technical feasibility factors include construction and operation difficulties, reliability of technology, ease of undertaking additional remedial actions, and the ability to monitor the effectiveness of the remedy. The administrative feasibility includes the ability and time required for permit approval and for activities needed to coordinate with other agencies. Factors employed in evaluating the availability of services and materials include availability of treatment, storage, and disposal services with required capacities; availability of equipment and specialists; and availability of prospective technologies for competitive bidding.

4.1.7 Cost

The types of costs that would be addressed include: capital costs, O&M costs, costs of five-year reviews where required, present worth of capital and O&M costs, and potential future remedial action costs. Capital costs consist of direct and indirect costs. Direct costs include expenditures for the equipment, labor, and materials necessary to install remedial actions. Indirect costs include expenditures for engineering, financial, and other services required to complete the installation of remedial alternatives. Other annual O&M costs are incurred after the remedial activities are completed.

This assessment evaluates the costs of the remedial actions on the basis of present worth. Present worth analysis allows remedial alternatives to be compared on the basis of a single cost representing an amount that, if invested in the base year and disbursed as needed, would be sufficient to cover all costs associated with the remedial alternative over its planned life. A required operating performance period is assumed for present worth and is a function of the discount rate and time. A discount rate of seven percent is assumed for a base calculation. The "study estimate" costs provided for the remedial actions are intended to reflect actual costs with an accuracy of –30 to +50 percent.

The breakdown of major facilities and construction components for the remedial alternatives, and the detailed breakdown of capital and annual O&M cost estimates, are presented in Appendices A and B, respectively.

4.1.8 State Acceptance

This assessment evaluates the technical and administrative issues and concerns the state may have regarding each of the remedial alternatives. The factors to be evaluated include actions that the state supports, has reservations about, or opposes.

4.1.9 Community Acceptance

This assessment incorporates public input into the analysis of the remedial alternatives. Factors of community acceptance to be discussed include supportiveness, reservations, and opposition of the community.

4.2 Alternative Analysis

The following soil remedial alternatives were evaluated in detail against the seven evaluation criteria:

- Alternative 1: No Action
- Alternative 2: Limited Action
- Alternative 3: Excavation/Treatment (if necessary)/Off-Site Disposal

4.2.1 Alternative 1: No Action

4.2.1.1 Description

The No Action alternative for the contaminated soil would only include five-year reviews to assess the need for future remedial actions. Contaminated soils would be left in place with no treatment or controls to prevent human exposure to surface soils. The No Action alternative does not mitigate any exposure pathways nor does it reduce the toxicity, mobility, or volume of the contaminated soil.

The No Action alternative was retained to provide a baseline from which to compare the other alternatives.

4.2.1.2 Assessment

Overall Protection of Human Health and the Environment

Under this alternative, no remediation would occur. No cleanup or mitigation measures would be used to remediate the contaminated soils. This alternative would not promote any reduction in toxicity, mobility, or volume of the contaminants. Because this alternative does not include contaminant removal, five-year site reviews would be required. These reviews would include reassessment of human health and environmental risks.

Compliance with ARARs

The No Action alternative would not comply with the chemical-specific ARARs listed in Section 3.0. Action- and location-specific ARARs would not be triggered by No Action.

Long-Term Effectiveness

No remedial activities or institutional or engineering controls would be implemented to address the existing site conditions. There are no remedial activities that would be undertaken as part of this alternative, therefore no RAOs would be met. Therefore, the risk associated with direct contact with contaminated soils would not be reduced.

Reduction of Toxicity, Mobility or Volume

The No Action alternative would not result in a reduction of toxicity, mobility, or volume of contaminants since no active measures would be employed.

Short-Term Effectiveness

Risks to the community would not be increased: however, future disturbance of the surface soil would increase exposure risks through direct contact, inhalation, and ingestion of airborne dust.

Since no remedial activities would be completed with this alternative, no risks would be posed to workers.

Implementability

Technical Feasibility

No technology would be applied to carry out the No Action alternative.

Administrative Feasibility

The No Action alternative would require administrative coordination in performing site reviews every five years. Coordination with state and local authorities would be required in the future for reviewing the five-year assessment data and making the appropriate decisions. This alternative would not involve any discharge permits or off-site activities.

Availability of Services and Materials

This alternative would not involve any treatment, storage, or disposal.

Cost

There is no capital cost associated with this alternative. There are also no O&M costs associated with this alternative.

4.2.2 Alternative 2: Limited Action

4.2.2.1 Description

The Limited Action alternative would provide capping to minimize exposure to contaminated soil. For evaluation purposes, the areas to be capped for each area of contamination were estimated to be the same areas that would require removal to meet the PRG (see Appendix C). For Properties 1, 13, and 18, the areas to be capped total approximately 9,500 square feet (sf); the areas for Properties 1, 13, and 18 are shown on Figures 4-1, 4-2 and 4-3, respectively. During pre-design, these areas may be adjusted to cap additional areas and/or to be consistent with current or planned property uses. Additional areas of contamination (if any) identified during the pre-design investigation would also be capped. For the development of this alternative, it was estimated that 25 properties within the study area may be sampled during the pre-design investigation. It was further estimated that 12 additional areas of contamination may be identified for remediation based on exceedence of the PRG. The estimated additional area of contamination is 20,000 sf.

The pre-design investigation may include sampling of interior dust. As necessary, based on the sampling results, this alternative would including interior cleaning of homes. The cleaning procedures employed would include: wiping down all horizontal exposed surfaces; vacuuming floors, drapes, upholstery, molding and window casings using High Efficiency Particulate Air (HEPA) vacuums; replacing carpets; washing all tile, linoleum, and wood floors; steam cleaning area rugs; cleaning heating and cooling ducts; and cleaning and replacing all filters on air handling equipment. Post-cleaning indoor dust samples will be collected to determine the effectiveness of the cleaning. For development of this alternative, it is estimated that 7 homes would require interior cleaning based on the sampling results.

This alternative would also include institutional controls to prevent exposure to surface soils. Controls would include implementation of deed restrictions to limit future use of the properties, implementation of public awareness programs, and five-year reviews to assess the need for future remedial actions.

4.2.2.2 Assessment

Overall Protection of Human Health and the Environment

The Limited Action alternative would entail no removal or treatment of the contaminated soil. This alternative is designed to minimize risk from direct contact and ingestion of soil through capping and land use restrictions. This alternative would not reduce the toxicity or volume of the contaminated soil; mobility may be reduced by capping. This alternative would raise public awareness, and reduce the risks posed to humans or the environment by the contaminated soils.

Compliance with ARARs

The Limited Action alternative would not comply with the chemical-specific ARARs listed in Section 3.0.

Long-Term Effectiveness

Institutional controls and capping would be implemented to address the existing site conditions. Therefore, the risk associated with direct contact with contaminated soils would be reduced.

Reduction of Toxicity, Mobility or Volume

The Limited Action alternative would not result in a reduction of toxicity or volume of contaminants since no active treatment measures would be employed; mobility of contaminants would be reduced by the placement of a cap over the contaminated soils.

Short-Term Effectiveness

Disturbance of the surface soil during cap construction could potentially increase exposure risks through direct contact, inhalation, and ingestion of airborne dust. These risks would be mitigated through the use of engineering controls (e.g., dust suppression, water sprays, etc.) to protect the community and personal protective equipment to protect workers.

Implementability

Technical Feasibility

Capping with a geotextile liner and soil is a conventional technology that could be readily implemented.

Administrative Feasibility

The Limited Action alternative would require administrative coordination in performing site reviews every five years. Coordination with state and local authorities would be required to institute land use restrictions, as well as in the future for reviewing the five-year assessment data and making the appropriate decisions. Coordination with property owners would be required. This alternative would not involve any discharge permits or off-site activities.

Availability of Services and Materials

This alternative would not involve any treatment, storage, or disposal. Specialists would be available for capping and public education programs.

Cost

The capital cost for this alternative is estimated to be $520,000. The annual O&M cost is estimated to be $20,000 for cap inspections, replacement of sod and landscaping, and maintenance of institutional controls. The net present value of this alternative is estimated to be $770,000, based on 30 years of O&M and a 7% discount rate.

4.2.3 <u>Alternative 3: Excavation/Treatment (if necessary) Off-Site Disposal</u>

4.2.3.1 Description

Alternative 3 includes the excavation of approximately 2,100 cy of contaminated soil (620 cy from Properties 1, 13, and 18, and an estimated 1,480 cy from additional areas of contamination that may be identified during the pre-design investigation) and off-site disposal at a RCRA or TSCA regulated landfill, as appropriate, based on the concentrations of PCBs in the excavated soils. Appendix C presents the estimated, volume calculations. Figures 4-1 through 4-3 depict the areas to be excavated on Properties 1, 13, and 18. If necessary, in order to meet the requirements of the disposal facilities, treatment of the soil may be performed using any of the technologies identified and retained in Section 2.0. Once excavation activities have been completed, clean soil will be used as backfill. The properties would be restored to their original condition by placement of sod and replacement of shrubs, fences, etc. Because this alternative includes removal of contaminants to applicable cleanup levels, periodic site reviews would not be required.

The pre-design investigation may include sampling of interior dust. As necessary, based on the sampling results, this alternative would include interior cleaning of homes. The cleaning procedures employed would include: wiping down all horizontal exposed surfaces; vacuuming floors, drapes, upholstery, molding, and window casings using HEPA vacuums; replacing carpets; washing all tile, linoleum, and wood floors; steam cleaning area rugs; cleaning heating and cooling ducts; and cleaning and replacing all filters on air handling equipment. Post-cleaning indoor dust samples will be collected to determine the effectiveness of the cleaning. For development of this alternative, it was estimated that 7 homes would require interior cleaning based on the sampling results.

4.2.3.2 Assessment

Overall Protection of Human Health and the Environment

Off-site disposal of contaminated soils would eliminate the risks due to exposure to these materials. Off-site facilities are designed and operated to be protective of human health and the environment. There would be some potential risk of worker exposure during implementation of this alternative that would require appropriate health and safety precautions.

Compliance with ARARs

The removal of PCB-contaminated soils would comply with the EPA SSL for Direct Ingestion (1 mg/kg). This alternative would be completed in compliance with chemical-, action-, and location-specific ARARs. The NJDEP soil cleanup criteria for PCBs (0.49 ppm), a TBC, may be achieved. Remediation at Tier I and Tier II homes achieved the NJDEP cleanup criteria at 2 properties.

Long-Term Effectiveness

Excavation and removal of contaminated soil would reduce the potential human health risks associated with direct contact with contaminated soils. Environmental impacts, though not determined to be significant, would also be reduced by implementation of this alternative. The selected off-site disposal facilities would be properly designed and operated in accordance with state and federal regulations, and thus, the long-term risks and liabilities posed by off-site disposal would be minimized.

Reduction of Toxicity, Mobility, or Volume

Off-site disposal would remove contaminated soil from the off-site properties, but would not reduce the toxicity volume of the contaminants. Disposal in an appropriately permitted off-site facility would significantly reduce the mobility of contaminants. Treatment of soils, if necessary to meet disposal facility criteria, would reduce the volume and toxicity of contaminants.

Short-Term Effectiveness

Implementation of this alternative could be accomplished with minimal risk to construction workers. During excavation and loading activities, there would be a risk of exposure due to contact and inhalation of contaminants. During these activities, personal protective equipment would be used as necessary. Other safety concerns include physical hazards related to construction. There would be an increase in truck traffic and associated noise, and an increase in dust levels during construction. Potential risk to the community could result from transport of material along public roads. Dust control procedures would be required in order to minimize fugitive dust emissions and appropriate containers would be used for transportation to minimize these potential risks. Access to the construction areas would be restricted during construction activities.

There would be no significant adverse environmental impacts, and erosion control measures would be used to minimize soil transport during precipitation events.

The beneficial results of the off-site disposal of contaminated material would occur immediately following implementation. The implementation time for this alternative is estimated to be three to six months. This would include pre-design, design, and construction activities.

Implementability

Technical Feasibility

Simple excavation and construction technologies would be implemented for this alternative. Conventional and standard earthwork equipment would be used.

Administrative Feasibility

Coordination would be necessary with property owners during construction activities in order to obtain permission to work on their property.

Availability of Services and Materials

Conventional excavation and construction technologies are well developed and available.

Cost

The estimated capital cost for this alternative is $760,000. There would be no O&M cost associated with this alternative and five-year reviews would not be required. The net present value of this alternative would therefore be $760,000.

4.3 Comparison Among Remedial Alternatives

The following subsection compares the relative performance of each alternative for each of the evaluation criteria. A summary of the detailed analyses of these alternatives is presented in Table 4-1. The following comparison highlights the substantive difference between the three soil remedial alternatives.

4.3.1 Overall Protection of Human Health and the Environment

Implementation of Alternative 1 (No Action) or Alternative 2 (Limited Action) would not achieve RAOs. Alternative 2 would provide some protection through engineering and institutional controls such as land use restrictions and public education. Alternative 3 (Excavation/Treatment (if necessary) Off-Site Disposal) is much more protective of human health and the environment than Alternatives 1 and 2, since this alternative would reduce the mobility of contaminants through removal of the contaminated soils.

4.3.2 Compliance with ARARs

Alternatives 1 and 2 would not comply with the federal or state criteria for those ARARs required for the proper management of PCB-contaminated soils. Neither Alternative 1 nor 2 would achieve the chemical–specific ARARs; however, they would be implemented in accordance with action- and location-specific ARARs, as applicable. Alternative 3 would be implemented to achieve all ARARs.

4.3.3 Long-Term Effectiveness

The magnitude of residual risks is highest for Alternative 1 and somewhat reduced for Alternative 2. Alternative 2 relies on capping, land use restrictions, and public education as control measures, which are not highly reliable. Alternative 3 eliminates the risks associated with contaminated soil through removal of the soil, disposal at an off-site landfill, and backfilling with clean fill.

4.3.4 Reduction of Toxicity, Mobility, or Volume

Alternative 1 provides no reduction to the toxicity, mobility, or volume of contaminated soils. Alternative 2 would reduce the mobility of contaminants through capping but would not reduce volume or toxicity. Alternative 3 would reduce contaminant mobility through removal and disposal of the soils at an approved off-site disposal facility. Furthermore, pre-disposal treatment, if necessary, would reduce the toxicity and volume of the contaminated soils.

4.3.5 Short-Term Effectiveness

No short-term adverse impacts to the community would be expected for Alternative 1. Minimal impacts would be expected for Alternative 2 during cap construction. Impacts to workers and the community would be mitigated through personal protective equipment and engineering controls. Alternative 3 would cause an increase in truck traffic, noise, and potentially dust in the surrounding community, as well as potential impacts to workers during remedial actions. These potential impacts would be created through construction activities and exposure to the contaminated soil being excavated and handled. Engineering controls, personal protective equipment, and safe work practices would be used to address potential impacts to workers and the community.

No environmental impacts would be expected from Alternative 1. For Alternatives 2 and 3, erosion control and dust control measures would need to be taken to prevent possible impact.

4.3.6 Implementability

No technical implementability concerns exist for any of the three alternatives. Alternatives 1 and 2 would include periodic reviews and inspections as a means of monitoring the effectiveness of the remedy. Administrative difficulties could be encountered during implementation of Alternative 2 for the establishment of land use restrictions on private properties. All technical components of Alternatives 2 and 3 would be easily implemented using conventional construction equipment and materials. Off-site disposal facilities are available for the disposal of the contaminated soils for Alternative 3.

4.3.7 Cost

Alternative 1 has the lowest overall cost, having no capital or O&M cost and a net present worth of $0. Alternative 2 has a capital cost of $520,000 and a net present worth of $770,000. Alternative 3 has a capital cost and net present worth of $760,000; there are no O&M costs associated with this alternative.

SECTION 4

TABLES

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SUMMARY OF SOIL ALTERNATIVE ANALYSIS

CRITERIA	ALTERNATIVE 1 NO ACTION	ALTERNATIVE 2 LIMITED ACTION	ALTERNATIVE 3 EXCAVATION/TREATMENT (IF NECESSARY) OFF-SITE DISPOSAL
Description	No remedial action. Five year reviews	Inform local official/hold public meetings; institutional controls (e.g., voluntary land use restrictions), capping, five-year reviews.	Excavation of contaminated soils. Off-site disposal of excavated soil and backfilling of excavations with clean soil.
1. Overall Protection of Human Health and the Environment	Not protective of human health or the environment. Contaminated soils would remain in place; therefore, ecological and human health risks would not be reduced.	Reduction of human health risk due to capping, public education, and voluntary land use restrictions. Environmental risk reduction through capping.	Reduces risks to human health and the environment through removal of contaminated soils.
2. Compliance with ARARs			
* Compliance with Chemical-Specific ARARs	No chemical-specific ARARs would be achieved.	No chemical-specific ARARs would be achieved.	EPA Soil Screening Level for Direct Ingestion of PCBs (1 mg/kg) would be met. TSCA criteria would also be met, if applicable. Cleanup of all areas of contamination to NJDEP Soil Cleanup Criteria for PCBs (0.49 mg/kg) may be achieved. Remediation at Tier I and Tier II homes achieved the NJDEP cleanup criteria at 2 properties.
* Compliance with Action-Specific ARARs.	No action-specific ARARs triggered.	Would be performed in compliance with action-specific ARARs.	Would be performed in compliance with action-specific ARARs.
* Compliance with Location-Specific ARARs.	No location-specific ARARs triggered.	Would be performed in compliance with location-specific ARARs.	Would be performed in compliance with location-specific ARARs.
3. Long-Term Effectiveness			
* Magnitude of Residual Risks	Minimal to no reduction in baseline risk. Natural attenuation is not considered a significant removal mechanism for PCBs.	Minimal to no reduction in baseline risk. Natural attenuation is not considered a significant removal mechanism for PCBs. Capping would reduce exposure potential.	Residual risks would be acceptable because contaminated soil from properties with 95% UCL for PCBs greater than 1 mg/kg would be permanently removed from impacted properties.
* Adequacy of Controls	No controls implemented.	Adequacy of control to prevent human ingestion dependent on success of public awareness program and land use restrictions. Land use restrictions may be difficult to enforce. Capping would reduce exposures.	Adequacy of control to reduce human health risks would be high because contaminated soils above EPA SSL would be removed and disposed off-site.
* Reliability of Controls	No controls implemented.	Institutional controls are not highly reliable, since the possibility of violation exists. Capping could also be breached.	Removal and off-site disposal of soils posing an unacceptable risk to human health and the environment are permanent; therefore, excavation would be a very reliable alternative.

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CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SUMMARY OF SOIL ALTERNATIVE ANALYSIS

CRITERIA	ALTERNATIVE 1 NO ACTION	ALTERNATIVE 2 LIMITED ACTION	ALTERNATIVE 3 EXCAVATION/TREATMENT (IF NECESSARY) OFF-SITE DISPOSAL
4. Reduction of Toxicity, Mobility, or Volume			
* Treatment Process and Remedy	None.	None.	Soils requiring removal would be excavated and transported to an off-site landfill for disposal. Soils with PCB concentrations less than 50 mg/kg may be accepted at a non-hazardous landfill permitted to accept low levels of PCB waste. Soils containing ≥ 50 mg/kg PCBs (including soils > 500 mg/kg) would be transported to a TSCA permitted landfill. Alternatively, these soils may be disposed at a RCRA Subtitle C landfill if the facility is permitted to accept TSCA wastes.
* Amount of Hazardous Material Destroyed or Treated	None.	None.	Hazardous material will be removed from the site. It is not anticipated that hazardous material would be destroyed under this alternative, unless the disposal facility required treatment (e.g., incineration) prior to landfilling.
* Reduction of Toxicity, Mobility, or Volume	No reduction of toxicity, mobility, or volume.	No reduction of toxicity, mobility, or volume.	All soils excavated would be transported to RCRA or non-hazardous landfills depending on PCB concentrations, thereby reducing mobility. It is not anticipated that treatment would be required prior to landfilling; therefore, no reduction in toxicity or volume would occur.
* Irreversibility of Treatment	No treatment employed.	No treatment employed.	Excavated soils are not anticipated to require treatment prior to disposal. However, excavation and off-site disposal of contaminated soils is a permanent remedial action and is therefore not reversible.
* Type and Quantity of Residual Waste	No residual waste since no treatment is involved.	No residual waste since no treatment is involved.	No residual waste would be present on the properties because the soils would be removed for off-site disposal. As treatment prior to landfilling is not anticipated, no additional residuals are expected to be generated. Should treatment be necessary, residuals such as ash may be generated; these would also be disposed at off-site landfills.
5. Short Term Effectiveness * Protection of community during remedial activities	No short term risk to community.	No short term risk to community from institutional controls. Installation of cap could generate dust. Appropriate engineering controls (e.g., dust suppression, water sprays, etc.) would be implemented to minimize impacts to the community.	Temporary increase in dust would occur during excavation and loading of soils. Appropriate engineering controls (e.g., dust suppression, water sprays, etc.) would be implemented to minimize impacts to the community. There would also be an increased risk of spills and tracking of contaminated material, which would be controlled through appropriate decontamination procedures and proper work practices.

TABLE 4-1 (Sheet 3 of 4)

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SUMMARY OF SOIL ALTERNATIVE ANALYSIS

CRITERIA	ALTERNATIVE 1 NO ACTION	ALTERNATIVE 2 LIMITED ACTION	ALTERNATIVE 3 EXCAVATION/TREATMENT (IF NECESSARY) OFF-SITE DISPOSAL
* Protection of workers during remediation	No remediation, therefore not applicable.	Temporary increase in dust would occur during capping. An increased risk of inhalation of contaminated soils would be posed to workers. This risk would be minimized through the use of personal protective equipment and dust control measures.	Temporary increase in dust would occur during excavation and loading of soils. An increased risk of inhalation of contaminated soils would be posed to workers. This risk would be minimized through the use of personal protective equipment and dust control measures.
* Environmental Impacts	None from remedial activities; existing environmental impacts remain.	Minimal from remedial activities; existing environmental impacts may be reduced by capping.	During construction, increased traffic, noise and dust would temporarily impact the environment. Some vegetation (e.g., grass/shrubs) may be impacted by excavation activities. These impacts would be fully mitigated upon completion of the remedial activities.
* Time Until Protection is Achieved	No time required for implementation of No Action; protection is not achieved.	Capping would require approximately three to six months to implement. This time frame could vary based on additional areas of contamination that may be identified during pre-design activities.	Construction would require approximately 12 months. This time frame could vary based on additional areas of contamination that may be identified during pre-design activities.
6. Implementability <u>Technical Feasibility</u>			
* Ability to Construct and Operate Technology	No construction involved.	Minimal construction involved for capping. Conventional equipment would be used.	Simple excavation and construction technologies would be implemented. Use of conventional and standard earthwork equipment would be used.
* Reliability of Technology	Does not involve any technology.	Capping is a reliable technology if properly maintained.	Excavation and off-site disposal of contaminated soils is very reliable.
* Ease of Undertaking Additional Remedial Action if necessary.	If future action is necessary, can be easily implemented, but must go through the FS/ROD process again.	If future action is necessary, can be easily implemented, but must go through the FS/ROD process again. Cap may need to be disturbed if additional action required in capped areas.	If future action is necessary, can be easily implemented, but must go through the FS/ROD process again.
* Monitoring Consideration	No monitoring program.	No monitoring program.	No monitoring program.

400097

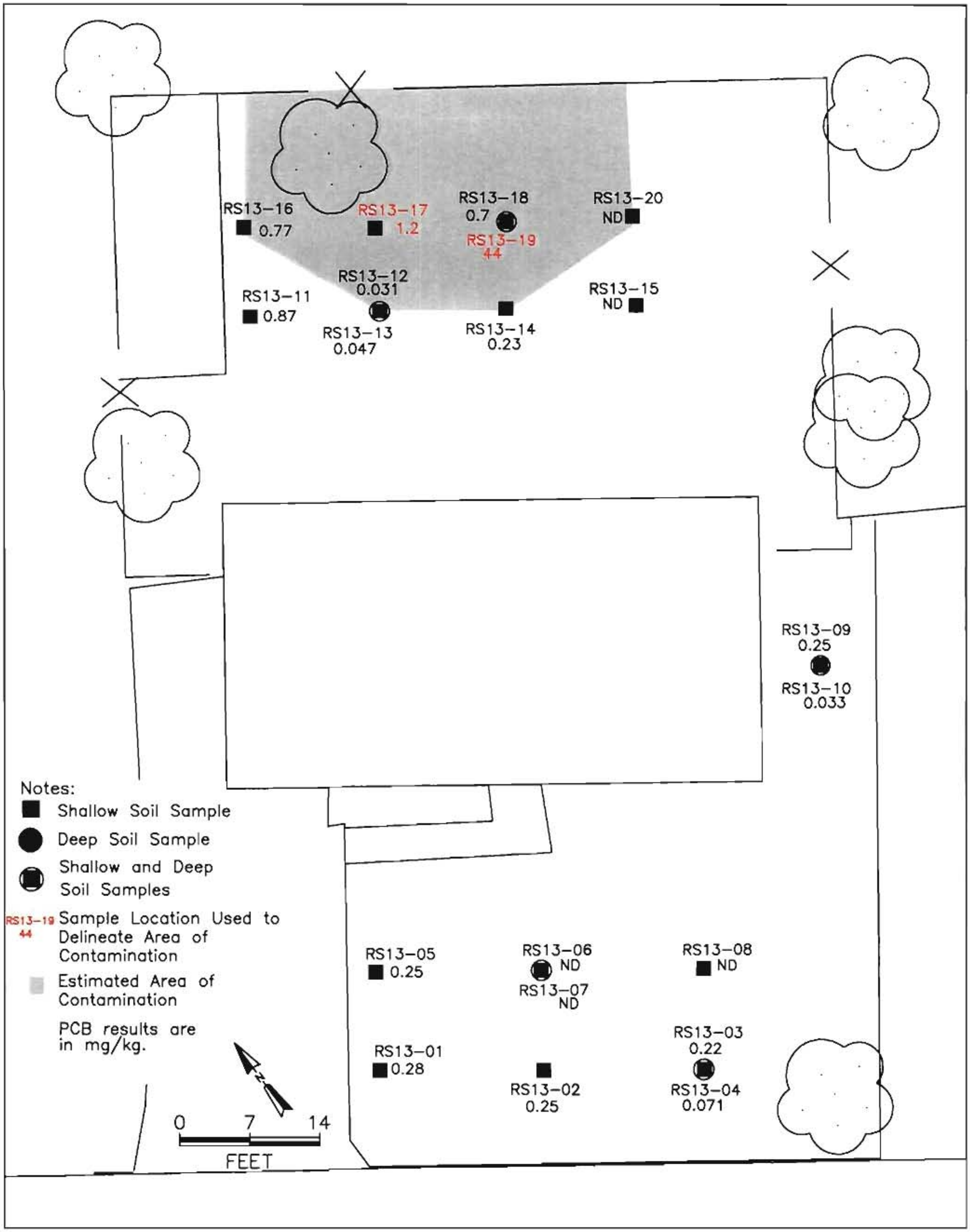
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SUMMARY OF SOIL ALTERNATIVE ANALYSIS

CRITERIA	ALTERNATIVE 1 NO ACTION	ALTERNATIVE 2 LIMITED ACTION	ALTERNATIVE 3 EXCAVATION/TREATMENT (IF NECESSARY) OFF-SITE DISPOSAL
Administrative Feasibility			
* Coordination with Other Agencies	Coordination with other government agencies would be required for five-year reviews.	Significant coordination with government agencies and property owners would be required for establishment of land use restrictions and coordination with property owners for capping. Some additional coordination for public awareness program. Some of these items are already in place for the site.	Coordination would be necessary with the property owners during construction in order to obtain permission to work on the private properties.
Availability of Services and Materials			
* Availability of Treatment Capacity and Disposal Services	None required.	None required.	Approved off-site facilities would be available for disposal of the excavated soils.
* Availability of Necessary Equipment and Specialist	No equipment or specialists needed.	Public relations professionals and legal advisors would be available. Equipment and personnel for capping are readily available.	Equipment and personnel for excavation and off-site transportation of contaminated soils are readily available.
* Availability of Technologies	No technology required.	Conventional capping technologies (asphalt or soil) are well developed and available.	Conventional excavation and construction technologies are well developed and available.
7. Costs			
* Total Capital Cost ($)	$0	$520,000	$760,000
* Annual Operation and Maintenance Cost ($/yr)	$0	$20,000	$0
* Present Worth $ (30 year, 7% Basis),	$0	$770,000	$760,000

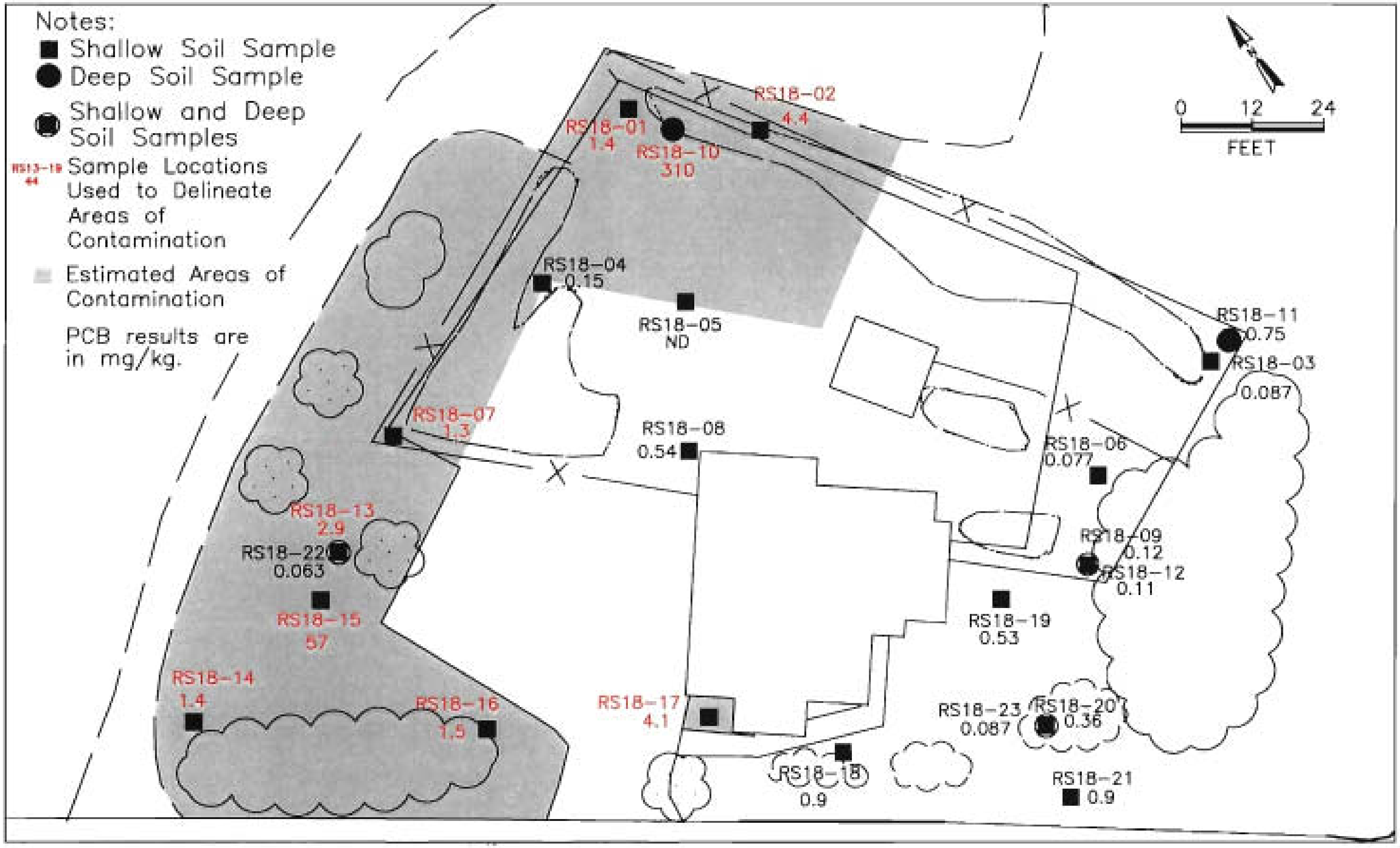
SECTION 4

FIGURES

400100 FOSTER WHEELER ENVIRONMENTAL CORPORATION	TITLE: Estimated Areas of Contamination Property 1 (408 Hamilton Boulevard) Cornell-Dubilier Electronics Superfund Site, OU-1	DWN: CTS	DES.:	PROJECT NO.: 1945.1018
		CHKD: WSD	APPD:	FIGURE NO.: 4-1
		DATE: 08/14/01	REV.: 2	



FOSTER WHEELER ENVIRONMENTAL CORPORATION	TITLE: Estimated Area of Contamination 400101 Property 13 (109 Arlington Avenue) Cornell-Dubilier Electronics Superfund Site, OU-1	DWN: CTS CHKD: WSD DATE: 08/14/01	DES.: APPD: REV.: 2	PROJECT NO.: 1945.1018 FIGURE NO.: 4-2



400102

FOSTER WHEELER ENVIRONMENTAL CORPORATION

TITLE:	DWN: CTS	DES.:	PROJECT NO.: 1945.1018
Estimated Areas of Contamination Property 18 (321 Spicer Avenue) Cornell-Dubilier Electronics Superfund Site, OU-1	CHKD: WSD	APPD:	FIGURE NO.: 4-3
	DATE: 08/14/01	REV.: 2	

SECTION 5.0

5.0 REFERENCES

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SECTION 6.0

6.0 GLOSSARY OF ABBREVIATIONS AND ACRONYMS

APEG	Alkali Metal Dechlorination
ARAR	Applicable or Relevant and Appropriate Requirements
bgs	Below Ground Surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	Chemical of Potential Concern
CT	Central Tendency
DRE	Destruction and Removal Efficiency
DUA	Dunellen-Urban Land Complex
DvA	Dunellen Variant Sandy Loam
DWA	Dunellen Variant-Urban Land Complex
EPA	United States Environmental Protection Agency
ERA	Ecological Risk Assessment
ESA	Ellington Variant-Urban Land Complex
F	Fahrenheit
FS	Feasibility Study
GAC	Granular Activated Carbon
GRA	General Response Action
HEPA	High Efficiency Particulate Air
HI	Hazard Index
KWB	Klinesville-Urban Land Complex
LDR	Land Disposal Restriction
mg/kg	Milligrams Per Kilogram
msl	mean sea level
NJDEP	New Jersey Department of Environmental Protection
O&M	Operation and Maintenance
OU	Operable Unit
Pa	Parsippany silt loam
PCBs	Polychlorinated Biphenyls
PRG	Preliminary Remediation Goal
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
ReA	Reaville silt loam
RFA	Reaville-Urban Land Complex
RI	Remedial Investigation
ROD	Record of Decision
ROW	Right-of-way
RME	Reasonable Maximum Exposure
SARA	Superfund Amendments and Reauthorization Act
SSL	Soil Screening Level
SVOC	Semi-Volatile Organic Compound
TBC	To Be Considered
TCE	Trichloroethene
TSCA	Toxic Substances Control Act
UCL	Upper Confidence Limit
USFWS	United States Fish and Wildlife Service
VOC	Volatile Organic Compound

APPENDIX A

APPENDIX A

MAJOR CONSTRUCTION COMPONENTS

TABLE A-1

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE 1: NO ACTION
MAJOR FACILITIES AND CONSTRUCTION COMPONENTS

FACILITY/CONSTRUCTION	ESTIMATED QUANTITIES	DESCRIPTION
No Major Facilities or Construction Components		

400112

TABLE A-2

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE 2: LIMITED ACTION
MAJOR FACILITIES AND CONSTRUCTION COMPONENTS

FACILITY/CONSTRUCTION		ESTIMATED QUANTITIES	DESCRIPTION
I.	GEOTEXTILE LINER	29,469 square feet	Installation of geotextile liner
II.	BACKFILL OFF-SITE AREA WITH CLEAN FILL, GRADE AND COMPACT	546 cubic yards	Capping of impacted areas with 6" clean soil
III.	PROPERTY RESTORATION	15 properties	Install sod and replace landscaping, fences, etc. to original conditions
IV.	LAND USE RESTRICTIONS	15 properties	Legal support for establishment of land use restrictions on affected properties
V.	PUBLIC AWARENESS PROGRAM	Lump Sum	Hold public meetings and mail campaign
VI.	INTERIOR CLEANING (AS NECESSARY)	7 Homes	Temporary re-location of residents; wiping down all horizontal exposed surfaces; vacuuming floors, drapes, upholstery, molding and window casings using HEPA vacuums; replacing carpets; washing all tile, linoleum and wood floors; steam cleaning area rugs; cleaning heating and cooling ducts; cleaning and replacing filters on air handling equipment; post-cleaning indoor dust samples to determine the effectiveness of the cleaning.
VII.	HEALTH AND SAFETY	Lump Sum	Health and Safety Equipment and monitoring
VIII.	MOBILIZATION/DEMOBILIZATION	Lump Sum	Mobilization, setup, and demobilization of labor and equipment.

TABLE A-3

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE 3: EXCAVATION/TREATMENT (IF NECESSARY)/OFF-SITE DISPOSAL
MAJOR FACILITIES AND CONSTRUCTION COMPONENTS

FACILITY/CONSTRUCTION	ESTIMATED QUANTITIES	DESCRIPTION
I. DECONTAMINATION PAD	Lump Sum	Decontamination Pad for equipment
II. EXCAVATION OF SOILS	2,105 cubic yards	Excavation of PCB (Aroclor-1254 and Aroclor-1260) contaminated soils
III. BACKFILL OFF-SITE EXCAVATED AREA WITH CLEAN FILL, GRADE AND COMPACT	2,105 cubic yards	Backfill excavated area with clean fill
IV. PROPERTY RESTORATION	Lump Sum	Install sod, replace landscaping, fences, etc. to original condition.
V. OFF-SITE DISPOSAL OF CONTAMINATED SOILS AT RCRA LANDFILL	2,105 cubic yards (3,160)	Transportation and disposal of PCB (Aroclor-1254 and Aroclor-1260) contaminated soils. Based on PCB concentrations, it is assumed that no treatment would be required prior to landfilling.
VI. INTERIOR CLEANING (AS NECESSARY)	7 Homes	Temporary re-location of residents; wiping down all horizontal exposed surfaces; vacuuming floors, drapes, upholstery, molding and window casings using HEPA vacuums; replacing carpets; washing all tile, linoleum and wood floors; steam cleaning area rugs; cleaning heating and cooling ducts; cleaning and replacing filters on air handling equipment; post cleaning indoors dust samples to determine the effectiveness of the cleaning.
VII. HEALTH AND SAFETY	Lump Sum	Health and Safety equipment and monitoring
VIII. MOBILIZATION/DEMOBILIZATION	Lump Sum	Mobilization, setup, and demobilization of labor and equipment

APPENDIX B

APPENDIX B

CONCEPTUAL COST ESTIMATES

TABLE B-3

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE 3: EXCAVATION/TREATMENT (IF NECESSARY)/OFF-SITE DISPOSAL
CAPITAL COST ESTIMATE (2001 DOLLARS)

Description	Quantity	Mat. unit	Material	Ins. unit	Installation	Total
I. Decontamination Pad	1	5000	500	2,000	2,000	2,500
II. Excavation of off-site soils	2,105	0	0	20	21,052	21,052
III. Backfill of off-site excavated area with clean fill, grade and compact	2,105	20	42,104	10.00	21,052	63,157
IV. Property Restoration	15	2,500	37,500	2,500	37,500	75,000
IVa. Replacement Contingency - 10%						7,500
V. Off-site disposal of contaminated soils at a RCRA landfill	3,158	0	0	75	236,838	236,838
VI. Interior Cleaning	7	0	0	20,000	140,000	140,000
VII. Health and Safety	1	0	0	10,000	10,000	10,000
VIII. Mobilization/Demobilization	1	0	0	5,000	5,000	5,000

Subtotal	561,046
Contingency (20%)	112,209
Engineering (10%)	56,105
Legal (5%)	26,052
Grand Total	**757,413**

400117

TABLE B-4

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE 1: NO ACTION
ANNUAL OPERATION AND MAINTENANCE COST ESTIMATE (2001 DOLLARS)

Description	Basis of Estimate	Years

There is no O&M cost associated with this alternative.

400118

TABLE B-5

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE 2: LIMITED ACTION
ANNUAL OPERATION AND MAINTENANCE COST ESTIMATE (2001 DOLLARS)

Description	Basis of Estimate	Annual Cost	Years
I. Cap Inspection	2 inspection per year, 1 day per inspection	$5,000	1-30
II. Cap Maintenance	10% of capital cost	7,531	1-30
III. Landscape Replacement	10% of capital cost	7,500	1-30
Total Annual O&M		20,031	
Total Present Worth of O&M*		**$248,565**	

* Based on 7% discount rate.

400119

TABLE B-6

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE 3: EXCAVATION/TREATMENT (IF NECESSARY)/OFF-SITE DISPOSAL
ANNUAL OPERATION AND MAINTENANCE COST ESTIMATE (2001 DOLLARS)

Description	Basis of Estimate	Annual Cost	Years

There is no O&M cost associated with this alternative.

400120

TABLE B-2

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE 2: LIMITED ACTION
CAPITAL COST ESTIMATE (2001 DOLLARS)

	Description	Quantity	Mat. unit	Material	Ins. unit	Installation	Total
I.	Geotextile liner	29,469	1	29,569	1	29,469	58,.938
II.	Backfill off-site area with clean fill, grade and compact	546	20.00	10,914	10	5,457	16,372
III.	Property Restoration	15	2,500	37,500	2,500	37,500	75,000
IV.	Land Use Restrictions	15	0	0	5,000	75,000	75,000
V.	Public awareness program	1	0	0	10,000	10,000	10,000
VI.	Interior Cleaning	7	0	0	20,000	140,000	140,000
VII	Health and Safety	1	0	0	5,000	5,000	5,000
VIII.	Mobilization/Demobilization	1	0	0	5,000	5,000	5,000

Subtotal	385,310
Contingency (20%)	77,062
Engineering (10%)	38,531
Legal (5%)	19,265
Grand Total	**520,168**

400122

TABLE B-1

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE 1: NO ACTION
CAPITAL COST ESTIMATE (2001 DOLLARS)

Description	Quantity	Mat. unit	Material	Ins. unit	Installation	Total

This alternative would not require capital expenditures.

APPENDIX C

APPENDIX C

ESTIMATION OF SOIL AREAS/VOLUMES REQUIRING REMEDIATION

APPENDIX C

ESTIMATION OF SOIL AREAS/VOLUMES REQUIRING REMEDIATION

This appendix presents the methodology used for the estimation of contaminated soil volumes requiring remediation at the Cornell-Dubilier Electronics Site Off-Site Properties. The approach is to remediate contaminated soil at each area of contamination to achieve the PRG of 1 mg/kg.

Areas of Contamination - Properties 1, 13, and 18

Proposed areas and depths of excavation have been delineated for each property based on existing sampling data. Final verification sampling is proposed to be completed prior to excavation in order to verify the limits of excavation and minimize the duration of open excavation on each property. The results of this sampling will be used to refine the excavation depths and areas described herein.

The following approach was used for defining the preliminary areas of contamination based on the PRG of 1 mg/kg:

- The area of contamination associated with a single sample location exceeding the PRG was considered to be rectangular.

- Horizontal boundaries of areas of contamination were established at the nearest sampling location that did not exceed the PRG. Barriers such as walls and pavement boundaries, where present, and the property boundaries (or associated limits of residential use) were also taken to be horizontal boundaries.

- The depth of excavation for each area of contamination is estimated based on the depth of the soil sample requiring removal. Removal depth for shallow samples was estimated to be one foot; for deep samples, 2 feet. The greatest depth within an area of contamination is used as the excavation depth for the active area of contamination.

Figures C-1, C-2, and C-1 present the preliminary area of contamination for Properties 1, 13, and 18, respectively. Table C-1 summarizes the estimated removal volumes for each property. Actual soil volumes for removal will be determined during pre-design investigation activities.

Areas of Contamination - Additional Properties

Based on the results of the Tier III and RI samples collected along the ROWs of several streets in the vicinity of the site, it is likely that additional areas of contamination are present in the study area. Figure 1-6 shows study area which may contain additional areas of contamination.

For the purpose of estimating additional soil volumes to be addressed in this FS, the following assumptions were made:

- Areas of contamination would be identified on 12 additional properties;

- 50% of the area of the 12 properties would be covered by structures, concrete, or asphalt and would not require remedial action.

- 25% of the area on the 12 properties not covered by impervious material would require remedial action to achieve the PRG.

- The depth of the areas of contamination would be two feet.

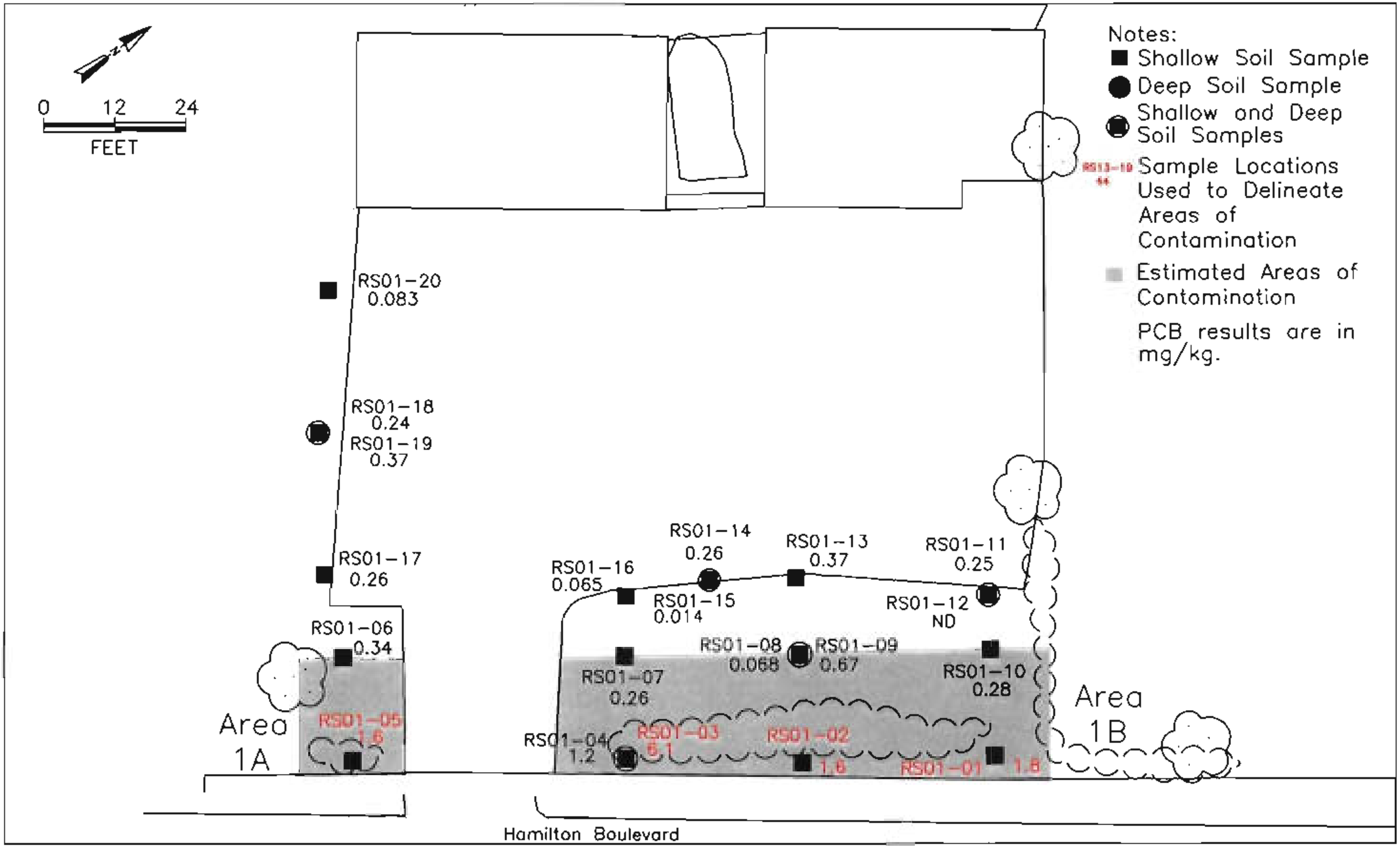
Using these assumptions, additional areas of contamination within the study area were estimated to include approximately 20,000 square feet and 1,480 cubic yards of soil requiring remedial action to achieve PRGs.

TABLE C-1

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ESTIMATED REMEDIATION AREAS/VOLUMES

Area of contamination Designation	Area (ft^2)	Depth (ft)	Volume (cy)
1A*	336	1	12
1B*	1713	1	63
13A*	756	2	56
18A*	6616	2	490
18B*	48	1	2
Additional Areas**	20,000**	2**	1,480**

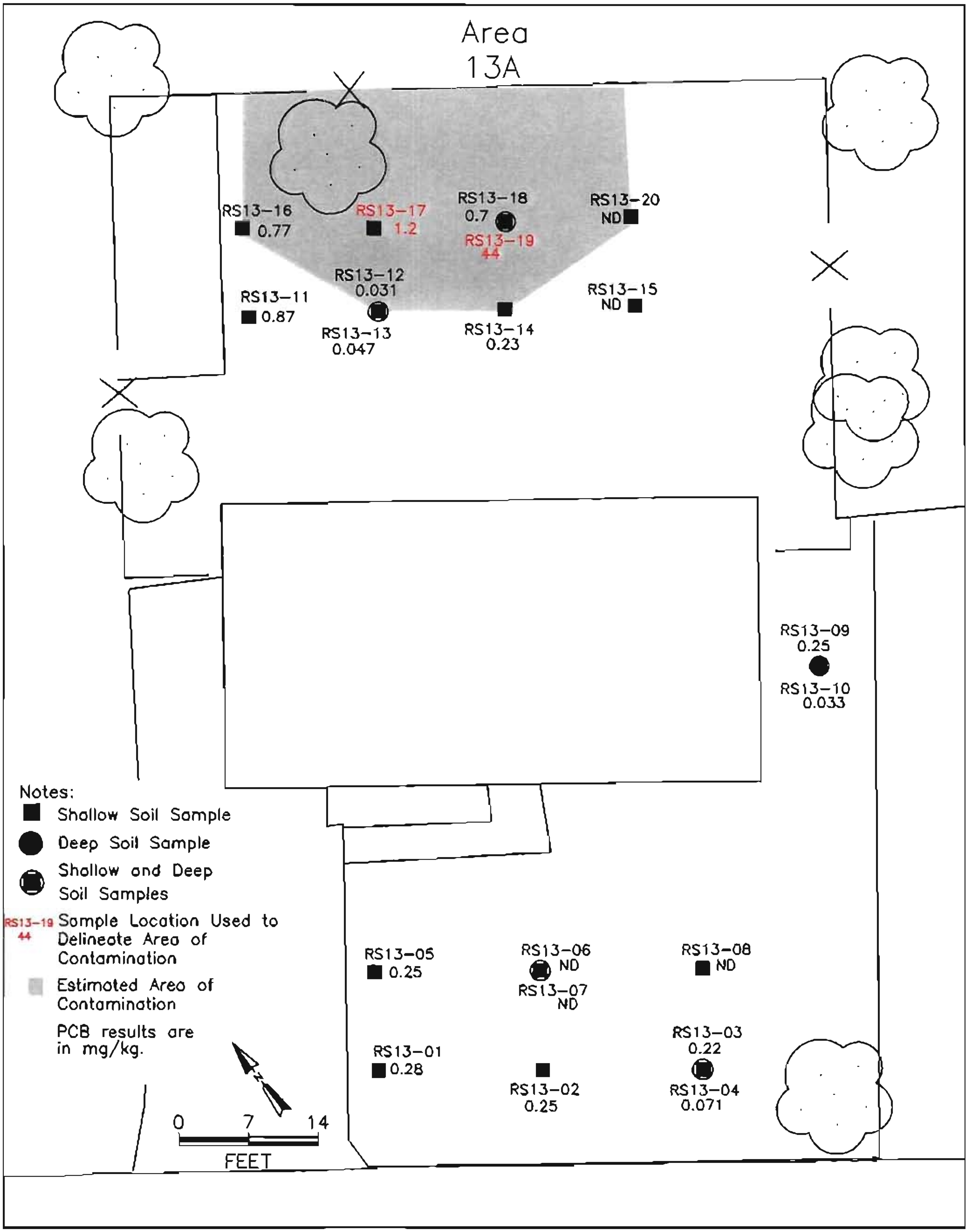
*See Figures C-1 through C-3 for corresponding areas.
** Estimated as described in text



400128

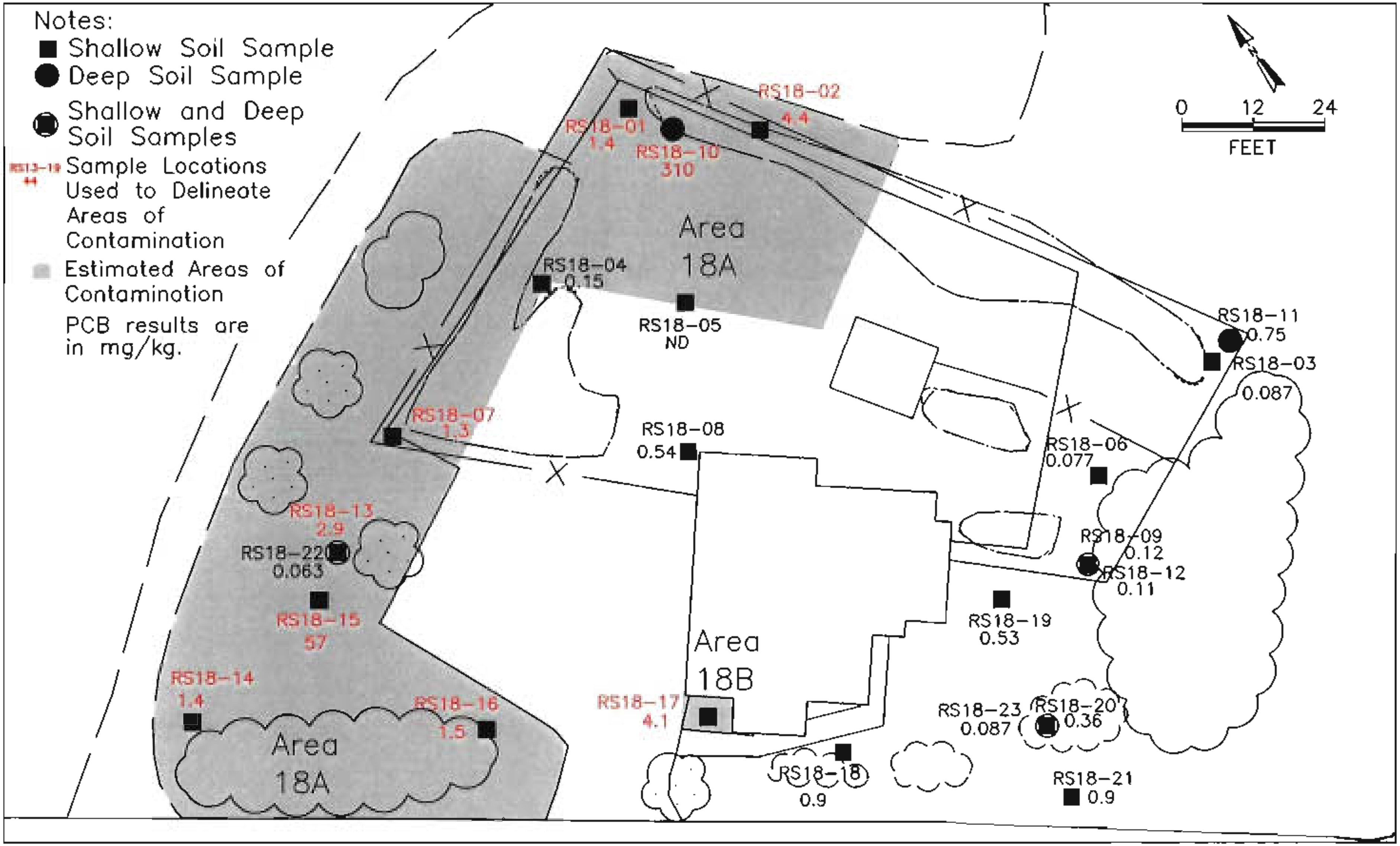
FOSTER WHEELER ENVIRONMENTAL CORPORATION

TITLE: Estimated Areas of Contamination Property 1 (408 Hamilton Boulevard) Cornell-Dubilier Electronics Superfund Site, OU-1	DWN: CTS	DES.:	PROJECT NO.: 1945.1018
	CHKD: WSD	APPD:	FIGURE NO.: C-1
	DATE: 08/14/01	REV.: 2	



FOSTER WHEELER ENVIRONMENTAL CORPORATION

TITLE: Estimated Area of Contamination 400129 Property 13 (109 Arlington Avenue) Cornell-Dubilier Electronics Superfund Site, OU-1	DWN: CTS	DES.:	PROJECT NO.: 1945.1018	
	CHKD: WSD	APPD:	FIGURE NO.: C-2	
	DATE: 08/14/01	REV.: 2		



400130 FOSTER WHEELER ENVIRONMENTAL CORPORATION	TITLE: Estimated Areas of Contamination Property 18 (321 Spicer Avenue) Cornell-Dubilier Electronics Superfund Site, OU-1	DWN: CTS CHKD: WSD DATE: 08/14/01	DES.: APPD: REV.: 2	PROJECT NO.: 1945.1018 FIGURE NO.: C-3